

The Canadian Medical Association Journal

Vol. XV

TORONTO, SEPTEMBER, 1925

No. 9

An Address

ON

SURGICAL TREATMENT OF GASTRIC AND DUODENAL ULCER*

H. W. CARSON, F.R.C.S.

Senior Surgeon, Prince of Wales General Hospital, Tottenham, London, England

IN the investigation of a case of suspected gastric or duodenal ulcer so many factors arise that the position of the surgeon has advanced materially from his earlier status of a mere craftsman carrying out the instructions of his medical colleagues. At the present time it is as important for him as for the physician to understand the meaning of symptoms, to be able to appreciate the importance of the various lines of investigation and to make his own decision as to the advantages in a particular case of medical or surgical treatment. The natural result of this has been the gradual development of team work in which the physician and the surgeon are taking up more and more similar attitudes in conjunction with the radiologist and bio-chemist. Moynihan stated the case very clearly when he said that he was a physician compelled to treat his cases surgically. In the investigation of a case the physician and the surgeon are indistinguishable and in their treatment there is a general agreement that surgery has no part in acute ulceration and that purely medical treatment has but poor chances of success in the chronic cases. So that when we come to the surgical treatment of gastric and duodenal ulcer you must understand that I refer to chronic ulcer only.

We must all agree that before it is possible to recognize the abnormal one must have a good knowledge of the normal, and the investigation of the normal stomach has been of great value and has led to some surprises.

Shape of the stomach.—It was not long before

it was realized that the traditional stomach of the old text books did not exist in the living body, and soon a new shape, the J shape of stomach, was described and variations from this so-called normal J shape were looked upon as pathological. Recent work has shown the necessity of revising this opinion. We must first of all recognize that in the erect position the greater curvature is below the level of the iliac crests in 75 per cent. of healthy men and nearly 90 per cent. of healthy women, and the hepatic flexure below this level in over 50 per cent. of healthy women.

We know now that there are three types of stomach which can co-exist with perfect digestive function. The great majority of healthy people have what is called an *orthotonic* stomach, the proportion being about 80 per cent. of men and women. This stomach shows normal position, normal peristalsis and normal emptying rate, and also has normal secretion in the same proportion. The next type, the so-called *hyper tonic* stomach, tends to lie obliquely from above downwards to the right, has well marked peristalsis and a rather rapid emptying rate. This is associated with a high acid content and is found in 17 per cent. of healthy men and only 7 per cent. of healthy women. Once more the secretion coincides with the type, i.e., about 15 per cent. with hyperchlorhydria. The third type, the *hypotonic*, has diminished peristalsis, a lower position (exaggerated J with a high pylorus) and a slower emptying rate. This is found in 4 per cent. of healthy men and 15 per cent. of healthy women and here again the secre-

*Before the Canadian Medical Association, Annual Meeting, Regina, June 24, 1925.

tion coincides with the type, about 5 per cent hypochlorhydria. Further investigation shows that the hypertonic stomach is found more commonly in broad chested vigorous people and the hypotonic in narrow chested people who take little exercise. It will be seen then that caution must be exercised in deciding whether or not abnormal gastric tone is pathological, and it must be considered in relation to the physical peculiarities and habits of the individual.

The motility of the stomach is estimated by the rate of emptying and this varies a little according as it is tested by the x-rays or by the Rehfuss tube, but it varies very much more according to the type of meal given. Thus beef and mutton leave the stomach more slowly than chicken and fish, bread leaves slowly and milk and cream may be held up for a long time, but a gruel meal will have left the stomach entirely in two hours. Then too there is the comparatively rapid emptying in the hypertonic or comparatively slow emptying in the hypotonic stomachs, a variation from the normal which may be common to the type of individual and must not in itself be considered pathological. Perhaps the most important factor in determining the emptying rate is the tone of the pyloric sphincter.

Secretory functions.—A great deal has been learnt of these functions since the routine use of the Rehfuss tube has been in operation. Rehfuss first described his method in 1914, but we had something else to think about at that time, and the method was not employed in England till the war was over. As you all know, the method consists in withdrawing the contents of the stomach at frequent intervals through a tube which shall be sufficiently small in diameter to be tolerated by the patient for any length of time.

The resting juice, that is the fluid present in the fasting stomach, is first withdrawn, then a simple test meal is given and a portion of the contents of the stomach is aspirated every fifteen minutes till gastric digestion is over. The specimens are received into numbered test tubes, filtered, and examined chemically. The main interest lies in the quantitative estimation of the acid content, whether free or combined, and in practice a normal acidity is recognized, a high normal is called hyperchlorhydria, a low normal hypochlorhydria, while if no acid secre-

tion can be detected the terms achlorhydria and achylia are used; the former implying that though acid is secreted it is neutralized in some way or other, the latter implying that no acid is secreted. It was very soon noticed that acidity may vary considerably in healthy subjects and it was found that it corresponded very closely with the tone of the stomach and therefore with the type of individual; so that a healthy subject with a normal stomach will have a normal acidity, a healthy subject with a hypertonic stomach will have a high normal acidity and a healthy subject with a hypotonic stomach will have a low normal acidity. Neither hyperchlorhydria nor achylia are in themselves pathological, though of course they occur more commonly in diseased conditions. A regular sequence was recognized, the acidity of the resting juice falling when the meal was given and then gradually rising to its maximum in an hour and a half, then gradually falling to normal in two and a half hours. Then came the question as to the cause of this general reduction in acidity and it is now accepted that the main cause is a reflux of the alkaline duodenal contents; and so one sees that the behaviour of the pyloric sphincter is again a most important factor, for if there is spasm preventing duodenal reflux, the rising tide of acidity goes on unchecked and a high acid content results; if the pyloric sphincter is relaxed, duodenal reflux is encouraged and a low acid content results. An immediate difficulty arises to explain the high acid content in duodenal ulcer, for we know that in this disease, the stomach empties rapidly and almost continuously and one might imagine that with the pylorus practically always open duodenal reflux could occur and neutralization take place. This does not happen, however, because the tide sets so strongly from the stomach that regurgitation cannot take place and in addition the force of gravity is against it as the typical stomach in duodenal ulcer is of the cowhorn type obliquely placed in the abdomen from above downwards to the right. The opposite extreme is seen in cases of gastric cancer where frequently the stomach empties itself rapidly and yet there is achylia. The explanation of this is that in gastric cancer, acid secretion is reduced to a minimum or is even non-existent. Certain diseases are associated with constant

variations in gastric acidity and it is enough to mention the hyperchlorhydria of duodenal ulcer and gastric ulcer with pyloric spasm and the hypochlorhydria of many wasting diseases such as chronic pulmonary tuberculosis, and the achylia of pernicious anaemia and cancer of the stomach.

Gastric secretion is influenced also by the type of food ingested, thus beef and mutton and particularly the extractives of meat such as beef tea and soups, excite the secretion of HCl, and as these have very little protein to take up the acid, acidity is very high. Bread and milk cause less secretion and raw eggs cause hardly any, which accounts for the value of this form of food in patients suffering from acute gastric ulcer. Oils and fats actually decrease acid secretion and can therefore be given freely to gastric ulcer patients, but are not always well tolerated.

Duodenal reflux and pyloric sphincter control has always proved difficult to explain and elaborate theories have been advanced to account for it. It is probable after all, that sphincter control follows the ordinary law of peristaltic movement as laid down by Bayliss and Starling and that regurgitation follows the natural laws of gravity and the varying pressures in the pyloric antrum and the duodenum.

Now I wish to say a few words about *pain* as an evidence of faulty gastro-intestinal function. Pain is the most important symptom in all gastric disorders. It is the symptom which brings the patient to the doctor and the true interpretation of its character is one of the most valuable means of diagnosis. It is necessary to classify pain under several heads:—(1) The type of pain, whether aching, boring, colicky and so on, local or diffuse; (2) the relation of its onset to the intake of food; (3) causes of relief or exacerbation; (4) the occurrence of free intervals.

We are all well aware of the differences between the pain of gastric ulcer and cancer, between that of gastric ulcer in its local stages and after it has caused perigastritis and implicated other organs such as the liver and the pancreas; we try to differentiate, often with poor success, between the pain of duodenal or gastric ulcer and the referred pain of chronic appendicitis or cholecystitis. We know that pain is commonly induced by taking food in ulcer

of the lesser curvature and relieved by taking food in duodenal ulcer, we know that relief can be obtained in most dyspepsias by vomiting or by taking bicarbonate of soda, and that relief or an increase of pain may result from certain postures. We know that in nearly all the dyspepsias, painful periods are followed by intermissions of perfect or almost perfect comfort and that generally the free intervals last longer than the painful periods. Unless we know, however, what is the cause of the pain we cannot place the proper interpretation on these variations. Two explanations were advanced and accepted for many years. First it was suggested that the pain was due to the actual contact of food with the ulcer, but this had to be abandoned when it was found that in duodenal ulcer, although the stomach contents passed into the ulcerated duodenum almost as soon as the food entered the stomach, pain rarely occurred until one or two hours had elapsed. Then it was suggested that the acidity of the gastric contents irritated the ulcer, but this had to be abandoned when Hurst failed, after administering large doses of a 5 per cent. solution of HCl, to cause pain in certain gastric ulcer patients. Another point is that the contents of the fasting stomach (resting juice) often have a high acidity and yet it is well known that pain rarely occurs in duodenal ulcer patients before breakfast. Gradually it began to become more and more evident that pain is due to disordered tonicity in the gastric musculature. Examination by the x-rays had shown that in ulcer of the lesser curvature there is commonly an associated contraction of the circular muscle fibres causing a characteristic notch in the greater curvature, and there is increased peristalsis and pyloric spasm. On the introduction of food, the stomach should dilate to accommodate the meal but this is prevented by the muscle contraction and probably also by some degree of infiltration of the muscle in the neighbourhood of the ulcer, and pain results. In duodenal ulcer on the other hand, the stomach, already in a condition of hypertonus, empties its contents at a rapid rate by hyperperistalsis, and it is only when the stomach is nearly empty and the already tired muscles have to make an extra effort to expel the remains of the meal that pain is experienced. The administration of

food at once relaxes the spasm and immediate relief is experienced. Relief is also obtained by the administration of bicarbonate of soda and this is due, not to neutralization of acidity, but to the effervescence and gas formation due to the action of the acid on the bicarbonate. This causes a temporary distension of the stomach and a consequent relief of muscular spasm. It must be a common experience that bicarbonate of soda gives more rapid relief than carbonate of bismuth and this is due to the fact that more gas is formed from the former. In carcinoma the pain is due to rigidity of the stomach wall and pyloric obstruction.

In certain cases of gastric and duodenal ulcer, pain is persistent and not influenced much by the intake of food. This symptom occurs in advanced cases and always means that the ulcer has penetrated deeply enough to cause perigastritis or even that the floor of the ulcer is formed by a neighbouring viscous. Perhaps the most characteristic of these pains is the boring pain felt in the back when a lesser curvature ulcer has penetrated into the pancreas. I had a patient under my care recently with a lesser curvature ulcer of huge size, the floor of which was formed by a shallow depression two inches by one inch in the liver and a typical egg cup depression in the pancreas. This patient had had for months a fixed pain in the right shoulder, and in the back between the scapulae. When he came round from his anaesthetic after a partial gastrectomy, he at once exclaimed that his pains had gone, and he has had no return of them so far.

The subject of *referred pain* is an interesting one. I am thinking particularly of what is called appendix dyspepsia. It is typical of the chronic appendix that it gives rise to epigastric pain and that this pain may closely simulate gastric or duodenal ulcer. The pain is due to disordered gastric peristalsis and tends to simulate gastric ulcer in the hypotonic type and duodenal ulcer in the hypertonic type. The chief guide to differentiation lies in the tone of the abdominal muscles and it may be stated as an axiom that rigidity means a local cause while the absence of rigidity is in favour of the pain being referred from some other source.

And now a few words on the genesis of gastric and duodenal ulcers. It is some fifteen years ago since Dr. William Hunter, physician

to Charing Cross Hospital in London, gave an address before McGill University on oral sepsis. He insisted that oral sepsis was the cause of many diseases and drove home his argument with a great wealth of pathological experience. His views are now universally accepted, especially as regards the relationship of oral sepsis and "indigestion." At the present day the first step taken by the medical man when consulted by a patient suffering from dyspepsia, is to investigate the nose, nasopharynx, and mouth in order to discover or exclude the presence of a septic focus. I have no doubt that the treatment of septic foci in these regions has been of enormous value in curing early cases of gastric and duodenal ulcer.

If sepsis in the upper alimentary tract is causative, it is possible that sepsis in the lower alimentary tract may have its part, so that infection reaches the stomach by the blood stream as the result of intestinal sepsis or chronic appendicitis. It seems probable that the same infective agent will cause gastric ulcer in the hypotonic type and duodenal ulcer in the hypertonic type.

With regard to the trend of modern thought on the treatment of gastric and duodenal ulcer, all are agreed that surgery has no place in the treatment of acute ulcer. Surgery confines itself to the chronic ulcer. At first, some twenty-five years or so ago, operation was done, excepting emergencies, for pyloric stenosis only; gastro-jejunostomy was the operation for choice, and the results were dramatically successful. As time went on gastro-jejunostomy began to be employed for other conditions where the pylorus was not constricted, in such conditions as duodenal ulcer and ulcer of the lesser curvature. I think it is not too much to say that the more the conditions under treatment differed from the original, the worse the results became, and the worst of all results followed the employment of gastro-jejunostomy in such conditions as gastropexy and hypotonus. A reaction took place and it was then laid down that operation on the stomach must not be done unless an ulcer or its effects could be demonstrated. This was a considerable advance, but dissatisfaction was still experienced, for it was found that the proportion of cures in gastric ulcer after gastro-jejunostomy was much lower than in the duodenal ulcer and

indeed that the cures in gastric ulcer were mostly in cases when the ulcer was near the pylorus. Another difficulty arose, namely the possibility that a chronic gastric ulcer might take on malignant changes. These two considerations led to a demand for a direct attack on the ulcer if it were in the stomach, and excision of the ulcer was practised. It was soon found that this was followed by a high rate of recurrence, and it was then combined with gastro-jejunostomy but without any great improvement in results. Then some form of partial gastrectomy was introduced and at the present time partial gastrectomy is being employed more and more in chronic gastric ulcer. At the same time it was felt that gastric and duodenal ulcers might be secondary to some infective focus which, if left untreated, would lead to recurrence and it became the rule, not only to eliminate sepsis in the nose and mouth but also to examine, at the time of operation, the condition of other abdominal viscera, especially the appendix and the gall-bladder, and deal with any abnormality discovered.

With regard to duodenal ulcer, the position was less complicated, for gastro-jejunostomy led to a cure of over 80 per cent. of cases, and of course, there was no risk that the ulcer if left would take on malignant changes. But here again the proportion of failures, if not high, is considerable, and especially was it discovered that if bleeding had been a marked feature of the case, there was a tendency for it to recur after gastro-jejunostomy. Hohlbaum of Leipzig, writing in 1922, gave the proportion as 22 per cent., and Hurst in 1924 makes the proportion as high as 42 per cent.; and so there has been a movement in favour of a direct attack on duodenal ulcer also and this has taken the form of excision with gastro-duodenostomy or the much more extensive operation of gastro-duodenectomy. Finney's operation of pyloroplasty has never been much practised in England because we seem to find few cases in which it can be done, and we are inclined to think that in too great a proportion of cases adhesions form and the pylorus is drawn up and fixed under the liver, leading to pyloric obstruction for which gastro-jejunostomy has to be done after all. It is too early yet to get an idea of the late results in these radical operations and we cannot yet say

whether the bugbear of gastro-jejunostomy, gastrojejunal ulcer, has been eliminated. Nor is it possible to give an approximate estimate of the immediate mortality, but there is no doubt that it is considerably higher than the mortality of gastro-jejunostomy which is less than 2 per cent. However, with experience, and particularly with the adoption of splanchnic anaesthesia as practised by Gordon Taylor, Professors Cade and Apperly, it is reasonable to hope that the immediate mortality will be considerably lessened.

It may interest you to hear the views current in England on the treatment of two complications of gastric and duodenal ulcer, namely, haemorrhage and perforation.

It is usual to describe haemorrhage under two heads, namely, acute haemorrhage and severe repeated haemorrhage, some of which have nothing to do with gastric or duodenal ulcer. I refer more particularly to cirrhosis of the liver, splenic anaemia and the condition first described by Sir William Hale-White to which he gave the name of "gastrotaxis."

It is obvious that for conditions such as these, operations on the stomach have no place. Indeed severe haemorrhage so rarely occurs in chronic ulcer, compared with its frequency in other conditions, that it must not be looked upon as pathognomonic of ulcer. Then there is a large class of haemorrhages occurring from acute ulcers. These cases often have a short history, indeed the haemorrhage may be the first sign, and differential diagnosis may be very obscure. Neilson from Faber's clinic, 1897-1909, reports ten deaths in 528 cases, only one or two of which had definite symptoms of ulcer before the haemorrhage. One is not tempted to operate on these cases as the lesion may be very difficult to find and even more difficult to treat. It is important, therefore, to consider the probable fate of these cases if treated medically. At a combined meeting of the Medical and Surgical Sections of the Royal Society of Medicine in London last year, a mass of evidence was produced to prove that under medical treatment the mortality is less than 4 per cent., while the mortality after operation was about 36 per cent. Some of these statistics were gathered before transfusion of whole blood was introduced, but even in later cases the mortality is heavy, so that there was a

very general agreement that medical treatment is indicated for haemorrhage from acute ulcers. A very much more difficult problem presents itself in cases of severe repeated haemorrhage where the diagnosis of a chronic ulcer is established. One has to realize that these cases are poor surgical risks already, that if a further haemorrhage takes place surgical intervention may be the *coup de grâce*, and yet that to control haemorrhage from a chronic ulcer which may have become widely adherent, a formidable operation may be necessary, as a single gastrojejunostomy is useless in such cases. Here is a case for the very close co-operation of the physician and surgeon who must decide whether the chances are in favour of recovery or not. The first step is always to have the blood grouped and a suitable donor of blood arranged for. At the same time the haemoglobin content is estimated. If it is below 30 per cent. transfusion is done at once. If it is agreed that success cannot be anticipated without operation, the question arises what operation should be done, and when it should be done. As regards the type of operation, it must be some form of partial gastrectomy designed to excise the bleeding area. Polya resection is probably the best, in a very favourable case a sleeve resection, and very rarely a local excision of the ulcer combined with a gastrojejunostomy. One does, in fact, whatever operation will control the bleeding according to the power of resistance of the patient. Then arises the question of the best time to perform the operation. Let us agree that the best course is to put a stop to the haemorrhage by medical means and do the radical cure three months later. In the particular cases under review that is impossible. It is agreed that operation is essential to save the patient's life. When should it be done? Should it be done while bleeding is actually occurring, or should one wait for a more favourable period. Gordon Taylor reported twenty-four cases operated on during the haemorrhage with a mortality of two, i.e., 8 per cent. In sixteen cases he did a gastro-duodenal resection. This is a fine record but it is doubtful whether it is within reach of the average surgeon. Sherren is in favour of operating after the haemorrhage has ceased, but says one must not wait more than forty-eight hours for fear of a recurrence. The ques-

tion of transfusing or not is settled by the haemoglobin content which must not be lower than 30 per cent. if success by operation is to be attained.

The treatment of perforation is becoming standardized. It is agreed on all hands that whatever is done the main factor for success is early recognition and early operation. Cases operated on within twelve hours should not show a higher mortality than 8 per cent., but the mortality advances with giant strides as delay increases. Discussion ranges round two considerations: (1) Whether to do a gastrojejunostomy at the time of the closure of the perforation, and (2) whether to drain. Opinion in England agrees that perforation occurs generally in the chronic ulcer and that in something like 20 per cent. a subsequent operation had to be done for persistence of symptoms of ulcer. Therefore there seems to be a *prima facie* case for some more radical operation than mere closure of the perforation.

It must be remembered, however, that some of these perforations are in regions of the stomach where you would not choose gastrojejunostomy as the curative operation, and therefore it is unreasonable to do it just because the ulcer is perforated. Again, though it is probable that when gastrojejunostomy is done, it is done in the most favourable cases, yet it seems to be attended with a slightly higher mortality than simple suture. Murphy's dictum in abdominal emergencies "Quick in and quicker out" seems to me to be particularly applicable to these cases and I recommend simple suture at the time and a curative operation later on.

With regard to drainage, opinion is setting more and more in the direction of limiting its use to late cases. We have long since given up flushing the abdomen and local drainage is no longer used. If a drain is used it consists of a single drain passed to the floor of the pelvis. I am afraid I am old fashioned in this respect. I consider it essential to sit my patients up to limit the risk of sub-diaphragmatic abscess and it seems reasonable to provide some outlet for the fluid which must accumulate in the pelvis. So I drain the pelvis with a single tube for at most forty-eight hours and I believe it reduces the incidence of pelvic abscess.

RHEUMATOID ARTHRITIS; ITS CAUSATION AND TREATMENT*

SIR HUMPHRY ROLLESTON, BART., K.C.B., M.D.

*Regius Professor of Physic in the University of Cambridge; President of the Royal College
of Physicians of London*

THE subject of what is commonly called rheumatoid arthritis is especially appropriate at Bath, with its long historical association with the treatment of joint disease, its special hospitals, and its wealth of clinical material.

For this discussion the designation "rheumatoid arthritis" may be taken to cover the group of chronic joint affections of uncertain nature, but it has been considered convenient to leave aside the condition of advanced osteo-arthritis, especially of the hip in old people, though it must be admitted that such a condition may be the outcome of the rheumatoid arthritis. Fibrosis, which Stockman says always precedes, and in any case is much the same as rheumatoid arthritis, except that, like panniculitis, it concerns connective tissues other than those in or about the joints, may, in order to reduce the already extensive scope of the subject, also be omitted. Regarded in this somewhat arbitrary fashion rheumatoid arthritis is, like splenic anaemia, a repository for syndromes not proved to be specific. The subject is so enormous that it is obviously impossible to touch on all its numerous aspects.

ETIOLOGY

The present conception of the disease is that it is infective, but it may be well to consider if this is absolutely certain.

The Question of Disordered Metabolism

In 1907, while admitting that treatment of focal infections is sometimes followed by amelioration or even cure of the affected joints, Sir Archibald Garrod—son of Sir Alfred, who in 1858 introduced the name rheumatoid arthritis—doubted if these cases are really examples of the specific disease rheumatoid arthritis, adding the cautious proviso, "assuming that such a specific disease exists." In 1923 he was of much the same opinion in opening a discussion at the

Royal Society of Medicine, at which Cassidy expressed his firm conviction that the importance of infection had been greatly exaggerated and, while granting the existence of a large group of cases of chronic infective arthritis, believed that there was also a genuine rheumatoid arthritis—a somewhat uncommon disease probably due to disordered metabolism. The question, then, is: Are all forms of chronic arthritis, with the exclusion of the nervous arthropathies, as in tabes and syringomyelia, gout, haemophilic and possibly psoriatic arthropathy (Garrod and Evans), to be regarded as due to infections with various micro-organisms of a low virulence, or ought an open mind to be still maintained as to the existence of cases independent of microbial infection from the start and due primarily to some disorder of metabolism analogous to gout as commonly accepted?

What evidence is there that disordered metabolism is the sole cause of rheumatoid arthritis or of a certain group of cases in this category? Hereditary disposition to arthritis is not a very strong argument, and what is much the same though a broader conception, the "arthritic diathesis" is not a very satisfactory conception; for they both might be regarded as, in other words, an inborn want of resistance to infection. Joint changes have been described in a few rare cases of that "inborn error of metabolism" alkaptonuria and ochronosis. According to Pemberton (1921), the basal metabolism is lowered, and the sugar tolerance is lowered in rheumatoid arthritis; but it might justly be argued that this really depends on infection as it returned to normal abruptly on removal of the focal infection. From his point of view, then, the metabolic defect appears to be limited to the carbohydrates, and might be regarded as, in common with the arthritis, due to infection.

It is impossible to deny that an inherent disorder of metabolism might favour an infective or toxic arthritis by diminishing the resistance, and that gouty deposits are found in chronic rheu-

*Abstract of opening paper of discussion on Rheumatoid Arthritis at 93rd Annual Meeting of the British Medical Association, held at Bath, July, 1925.

matoid joints, though they may be secondary rather than primary. On the other hand, it is known that an infection may, by inducing pancreatic disorder, lead to a more or less permanent lowering of sugar tolerance; Pemberton (1925) considers that such a permanent lowering of sugar tolerance accounts for the disappointing results of removal of definite foci. It may therefore be logically argued that a lowered sugar tolerance alone may also cause rheumatoid arthritis. But rheumatoid arthritis is not a feature of diabetes mellitus, even though infections are prone to occur; so that as regards disorder of carbohydrate metabolism as a primary factor in the causation of rheumatoid arthritis the positive evidence is very weak. Although infection may so affect the endocrine glands as to modify metabolism and thus favour joint changes, this is very different from postulating a primary error of metabolism independent of infection.

G. Draper (1920) argues that chronic arthritis represents a very profound constitutional disturbance in forces analogous to those concerned in acromegaly and thyroid insufficiency, and chronic arthritis due to thyroid insufficiency (Léopold-Lévi and Rothschild; Sergent) and to pluriglandular inadequacy, especially ovarian (Umber), has been described; but it may be objected that chronic infection is really the underlying factor of both the endocrine and the arthritic disorder. The endocrine element in arthritis has recently been discussed by H. K. Thompson, who divides the cases of arthritis into (a) isotrophic or chronic infective arthritis, due to, and curable by removal of, the infective focus, and differing structurally from the two following forms—(b) atrophic or rheumatoid arthritis occurring in individuals of the slender "carnivorous" type of Goldthwaite and Bryant, and associated with, but he does not say definitely due to, some evidence of endocrine dysfunction, often hyperthyroidism, (c) the hypertrophic, or osteo-arthritis of our nomenclature, attacking the "herbivorous" type of Bryant and Goldthwaite, with low metabolic rate, benefited by thyroid medication, and showing evidence of hypothyroidism. It will at once be obvious that as osteoarthritis and hypothyroidism are both common in advanced life, their coincidence does not prove that the joint lesion is secondary to the thyroid disorder. Thompson does not prove or, indeed, dogmatically claim more than that

"certain types of arthritis are not necessarily disease entities, but may be symptoms of, or coincident with, an endocrine dysfunction." Correspondence between the geographical distribution of endemic goitre and rheumatoid arthritis (McCarrison) and the disposing influence of hypothyroidism, which has been regarded as identical with the arthritic diathesis (L. J. Llewellyn, 1925), might be explained by the view that they are both results of an underlying endemic infection.

Infective Origin

The effects of oral sepsis, largely due to W. Hunter's advocacy and more recently to Billing's book and Willecox's papers, are now well known, and its association with arthritis is fully recognized; but this advance has occurred well within the lifetime of many of us, and the importance attached to it has progressively increased. The relative responsibility of the teeth and the tonsils has been variously estimated; the teeth and gums have been incriminated for 90 per cent. of the cases (Beddard; Willecox, 1923); Lillie and Lyons, from a series of 200 consecutive cases of tonsillectomy for arthritis, possibly a one-sided experience, considered the tonsils responsible for 79 per cent. of the arthritic cases. Pemberton (1921), on the basis of 400 cases, gives percentages of 52 for the tonsils and 33.5 for the teeth. Possibly they are about equally responsible, and they certainly may both be diseased in the same patient; but, as the tonsillar and peritonsillar infection may be secondary to the dental, the latter should perhaps be given the first place. Adenoids should of course be considered in the same category as the tonsils. With regard to the teeth, a distinction has rightly been drawn between (1) pyorrhœa, in which the infective agents are discharged into the alimentary tract and are therefore prone to set up secondary foci in the tonsils, and, if there is achlorhydria, in the gall bladder, intestines and appendix, but are not so likely to pass into the general circulation and reach the joints as in (2) apical infection of the teeth, which may occur in teeth superficially healthy and so require radiographic assistance for their detection; here, being in a closed space, absorption by the blood is more likely to take place. A secondary focus in the maxillary antrum may be due to local extension of dental

infection, and it is important to eliminate both foci. It would be interesting to have statistics showing what proportion of cases of rheumatoid arthritis are associated, on the one hand with pyorrhœa alone and on the other hand with the apical infection of the teeth only; I am informed that it should not be difficult to obtain cases with pyorrhœa but without any trace of apical infection.

It is perhaps still necessary to emphasize also the importance of the accessory nasal sinuses as sites of infection, which may be responsible for arthritis; sinusitic infection may be secondary to oral, dental, or pharyngeal lesions; or, conversely it may be primary and give rise to them. It seems probable that unless the exit of discharge, purulent or otherwise, is obstructed, sinusitis is, like pyorrhœa alveolaris, more likely to cause gastroenteritis and secondary foci in the gall bladder and vermiform appendix than systemic and arthritic infection. Cases of sinusitis responsible for arthritis may be latent and escape attention, and Dr. P. Watson-Williams believes that it is the slighter, rather than the profuse purulent forms of sinusitis that cause arthritis, because they are not accompanied by a polymorphonuclear leucocytosis which protects against the effects of absorption. For the detection of infection of the accessory sinuses transillumination and skiagraphy may be misleading and are not so satisfactory as puncture.

The activity of intestinal bacteria largely depends on the presence or absence of hydrochloric acid in the gastric contents. Achylia gastrica has been described in rheumatoid arthritis by Knud Faber, Woodward, and Mackenzie Wallis and Hurst. Coates and Gordon, adopting Hurst's explanation of the relation of subacute combined degeneration of the spinal cord to Addisonian (pernicious) anaemia, suggest that in rheumatoid arthritis, achylia gastrica allows the bacterial production of a toxin with a special predilection for the synovial membranes.

Intestinal auto-intoxication has been urged, especially by Sir Arbuthnot Lane, as a cause of chronic arthritis. Pemberton (1914), from numerous laboratory investigations, found that protein putrefaction is not a factor, but Mutch has developed Lane's conception on bacteriological lines. In 1915 he found intestinal infec-

tion with staphylococci in Still's disease; later he insisted on a long-chained streptococcus as a pathogenic intestinal organism, and the observation, made in 1921 by N. and J. Mutch, of its characteristic glycophile character or avidity for sugar, is of great interest in connection with Pemberton's successful results in restricting the carbohydrate intake of chronic rheumatoid patients. Mutch, like Lane, insists on the frequency of masked stasis and hidden infection in the intestinal tract of patients with rheumatoid arthritis. Beddard, however, considers that in the absence of signs, such as attacks of diarrhoea, pointing to infection of the intestinal mucosa, this is improbable. Primary infections of the colon, such as dysentery, have been considered to be rarely responsible for rheumatoid arthritis in this country, the great majority of colonic infections being secondary to oral infections. On general principles intestinal infection should be restrained by the antitoxic function of the liver from producing secondary changes in the joints, though it is possible that in certain cases bacteria might pass via the thoracic duct into the general circulation and so escape the hepatic filter. It would be interesting to know the results of tests for hepatic efficiency, such as Rosenthal's modification of the phenoltetrachlorphthalein test, in cases of severe chronic infective arthritis.

Infections of the genito-urinary tract, excluding those of gonococcal origin, do not play a prominent part in the production of arthritis, but it may occur in *Bacillus coli* infections of the urinary tract, in infections of the prostate and vesiculae seminales; and streptococci from chronic endocervicitis have been stated to be specially prone to cause arthritis (Moench). Attention was called by T. McCrae to prostatic infections as a cause of arthritis, especially of the spine, and among 100 cases of chronic arthritis von Lackum found that in thirty-two the only primary focus was in the prostate. Infection of the vesiculae seminales may extend from the prostate, and though often gonococcal or tuberculous, may be due to other micro-organisms.

Infections of the respiratory system have attracted comparatively little attention as a cause of chronic arthritis; Pierre Marie's chronic pulmonary osteo-arthropathy is, of course, a well marked example. Mention should be made of Poncet and Leriche's view, apparently widely accepted in France, that the commonest form of

chronic infective arthritis is that due to the toxins of a distant tuberculous focus acting on the joints; 50 per cent. at least of the cases ordinarily met with are thus explained (Mouri-quand and Michel), the joint affection being, in fact, analogous to a tuberculide of the skin. This conception of the widespread influence of tuberculosis has received little recognition and no support in this country, possibly because its pathogeny is still uncertain—namely, whether it is entirely toxic, the joints never being infected—and also because it is so different from ordinary tuberculous arthritis. H. Platt could not find any conclusive evidence that it was a pathological or clinical entity. Probably many would agree with Byfield's dictum that Poncelet's disease is merely chronic arthritis in a person with tuberculosis; but even then it should be borne in mind that the joint lesion might be modified by the presence of a tuberculous focus elsewhere; further, the long debated and now established syphilitic nature of tabes dorsalis should warn us to keep an open mind in the relation of tuberculosis to chronic arthritis of doubtful origin.

Skin infections, such as boils, may be responsible for rheumatoid arthritis, and Stockman has seen it in general dermatitis and lupus erythematosus; but whether or not chronic arthritis may follow impetigo, as nephritis has done (Guillard; J. Phillips), is an interesting point. The etiology of psoriatic arthritis has given rise to some discussion: Garrod and Evans remark that the rapid recovery of the joints "when the psoriasis clears up is unlike anything seen in cases ordinarily classed under the name rheumatoid arthritis and is only approached in severe cases of dysentery." This is perhaps evidence of the success of removal of a primary focus rather than of their contention that neither lesion is a mere complication of the other.

Consideration of Criticisms of the Infective Theory of Rheumatoid Arthritis

It has naturally been urged against the focal infection theory of rheumatoid arthritis that extensive infection, especially oral, may exist for a long time without the sequence of rheumatoid arthritis or other systemic lesions; and indeed it has been stated, probably with considerable truth, that few persons of mature years are entirely free from chronic septic foci. Fur-

ther, it has been insisted that in many cases of rheumatoid arthritis careful search fails to reveal a septic focus. In considering why very definite focal infection often fails to cause joint lesions, the constitution of the individual, his powers of resistance, must be taken into account; the moral, now well recognized in the case of tuberculosis, that the soil (the local conditions of the joints) as well as the seed (the infective agent) is an important factor in determining whether or not disease results, should be more extensively applied in rheumatoid arthritis. Cases certainly occur in which a focal infection exists for years before the onset of arthritic phenomena, which may then run a rapidly progressive course, crippling the patient in a few years. Something, perhaps an attack of influenza, has broken down the individual's immunity and powers of resistance, among which the bactericidal power of the gastric hydrochloric acid must be taken into account, or in a more marked degree has rendered him sensitive to micro-organisms or to foreign bacterial proteins to which he was previously immune. Another example of this acquired susceptibility is provided by cases following acute trauma, or the long-continued stresses and strains described by Sir Arbuthnot Lane.

But the disposing factor may be inherent and congenital, such as the anatomical conformation of the body and "the human constitution," which G. Draper (1924) has recently defined as "the aggregate of hereditarial characters, influenced more or less by environment, which determines the individual's reaction, successfully or unsuccessfully, to the stress of environment." Goldthwaite and Bryant described two types of departure from the normal, which they called the carnivorous, from their slender figure, and the herbivorous — broad-backed, heavy, and prone to degenerative diseases, such as arteriosclerosis, diabetes, and osteo-arthritis. The narrow-backed slender type are prone to tuberculous and other infections, many intestinal disorders, and, significant on these counts, rheumatoid arthritis. Crookshank in an able paper argues that in persons prone to become chronic arthritics there is often some morphological defect which renders a joint a place of diminished resistance. He gives examples of patients with rheumatoid joints showing definite evidence of congenital defect, such as incurved little fingers,

small thumbs, and ill formed terminal phalanges. He quotes André Léri's *pléonostéose familiare* as an extreme instance of deformity favouring subsequent disease, and Calot's observation of a congenital condition of the hip-joint, approaching dislocation, as a diagnosing factor to senile arthritis of the hip. The nervous origin of rheumatoid arthritis (Latham, 1886), ascribing the changes to disturbed trophic action, though now mainly of historic interest, may apply in a few instances—for example, in Charcot's arthropathy—by rendering the joints a *locus resistitiae minoris*.

It must be admitted that it is often difficult to detect the infective focus; this may depend on imperfection in our means of localizing them. For example, the accessory nasal sinuses, prostate, vesiculae seminales, or the internal female genital organs, may escape investigation; cryptic infection of submerged or apparently normal tonsils may easily be overlooked; or there may be a closed focal infection of the gall-bladder or appendix which may remain latent, not discharging their bacteria into the alimentary canal, so that bacteriological examination of the faeces may not give any clue. Another difficulty about focal infections is that the primary one, such as dental suppuration, may produce secondary foci, some of which are less easily removed—for example, in the tonsils, cervical glands, maxillary antrum, the gall-bladder, appendix, intestine, mesenteric glands (Mutch, 1915)—or one of several affected joints may act as a reservoir of infection. Mutch (1925) divides the infections of the alimentary canal into two zones—the upper, of the mouth and throat; the lower, of the bowel and its appendages; the second may be local or affect the whole, from the duodenum to the rectum. Thus extraction of the teeth may fail to relieve the joint symptoms because a secondary focus or foci have become active in distant and unsuspected parts. Thus, in a series of eighty cases of arthritis recorded by Brock, forty-two patients had had some focal infection removed, but all of them still had other foci remaining; twenty-five had lost their tonsils, and twenty-two of these still had infected teeth. One reason for the practical failure of the focal infective theory of rheumatoid arthritis is perhaps imperfect removal of the whole of the focal infection. Dentists are rightly conservative in extracting teeth they believe to be

sound, but if even one tooth with latent apical infection is left this may be sufficient to keep up the joint trouble, either by serving as a continued source of bacteria conveyed by the blood, or possibly merely by providing poisons which, acting on a joint rendered hypersensitive by previous infection, responds actively. Even when teeth are removed infected roots may be left behind to keep on the evil influence; thus, among 290 edentulous jaws, M. F. Eusterman found 129 root or other evidences of infection, and he believes that 37 per cent. of the areas to which dentures are adapted harbour infection. The position is made more difficult by evidence that x-ray examination of the jaws may fail to reveal infection of the apices of the teeth (Meisser and Haden).

An objection sometimes raised to the infective origin is that the average run of rheumatoid cases show little or no evidence of corresponding systemic and visceral damage. In reply it may be said that this is also true of many cases of undoubtedly focal infection. But, on the other hand, rheumatoid arthritis is often associated with fibrosis and neuritis, and in the juvenile form of rheumatoid arthritis, or Still's disease, the lymphatic glands are commonly and the spleen often enlarged, and occasionally visceral lesions are found in the kidneys and in rare instances in the liver.

If for the purpose of this discussion rheumatoid arthritis be regarded as a subacute or chronic inflammation of the joints due to infection, but not proved to be due to any definite bacterial agent, so that gonococcal, pneumococcal, and other known bacterial forms of arthritis are excluded, then it appears that, logically, an arthritis of chronic course associated with streptococcal or staphylococcal invasion of the tonsils or apices of the teeth and cured after removal of the focus and corresponding vaccine treatment, should be excluded from the group of joint affections of obscure origin for convenience described as rheumatoid arthritis. In general, however, this apparently logical sequence is not observed, and such a case, presumably streptococcal, is not removed from the category of rheumatoid arthritis. There is some reason for this want of strict consistency; the streptococci form a large and even yet, from their instability, imperfectly classified group, and among the various forms some only are responsible for chronic joint

lesions. The difficulty in the specificity of the streptococci makes it reasonable to wait before transferring these cases from rheumatoid arthritis to streptococccic arthritis.

A point of interest for discussion in the clinical phenomena of rheumatoid arthritis is how far toxic influences, as apart from continuous or repeated infection of the joints, play a part. A joint is infected, and as the result of local and other treatment the condition subsides, whether the causal organisms die out or remain latent being unknown. Is it not conceivable that the joint becomes hypersensitive and, in the event of any toxin reaching it from an infective focus, such as a single tooth with apical infection, reacts in an anaphylactic manner? There are other examples of a probable anaphylactic arthritic reaction, such as intermittent hydrarthrosis and possibly gout.

Bacteriology

The infection is obviously of low virulence and of a very chronic nature. Various organisms have been found in cases of rheumatoid arthritis, which would thus appear to resemble bronchitis and colitis in being not specific but due to a number of different infections, and therefore including a number of different diseases, though clinically in many ways alike. Various streptococci are most frequently incriminated.

In 1914 Hastings found that out of a series of cases seventeen gave a positive and eighteen a negative complement fixation test of *Streptococcus viridans*, and therefore considered, what would now be regarded as a very modest estimate, that 40 per cent. of the cases of rheumatoid arthritis are infective. Among Mutch's 200 cases of intestinal infection in chronic arthritis the vast majority were streptococccic, only 6 per cent. of which were haemolytic; from twenty-one cases examined in the course of laparotomies it appeared that the small intestine was the site of streptococccic invasion, a transition to *B. coli* infection taking place about the ileo-cæcal valve; it might thus be assumed that streptococci responsible for arthritis might not be recovered from faeces passed per anum. Beddard spoke of the long-chained organism *Streptococcus longus* as present in 75 per cent. of the cases.

Staphylococci appear to be much less often responsible than streptococci.

In 1903 Dor obtained *Staphylococcus pyogenes albus* from the joint of a rheumatoid patient. Crowe described as a causal agent *Staphylococcus epidermidis albus* (variety *deformans*) or *Micrococcus deformans*, and has obtained agglutination of their own scurf cocci by their blood in patients with severe rheumatoid arthritis. Among Mutch's 200 cases 4 per cent. only were associated with staphylococci.

Other micro-organisms, such as coliform organisms, have been described.

A natural objection to the infective nature of chronic arthritis is the difficulty of obtaining micro-organisms from the joints, and even when they are obtained from chronic cases, as Poynett and Paine (1902) did, it might well be argued that the infection has supervened in a joint rendered a place of diminished resistance by the arthritic change, and that the experimental production of joint changes in animals by the injection of such an organism does not prove that the original arthritic changes in the patient were due to the organism. That the fluid removed from rheumatoid joints is almost always sterile is not surprising from analogy with the same event in tuberculous pleurisy, but the rarity with which cultivation of pieces of synovial membrane removed from such joints gives a positive result in spite of the numerous media employed is a problem deserving further investigation and consideration, if the view that rheumatoid arthritis is due to a chronic infection rather than to a toxic or metabolic factor is to be maintained.

TREATMENT

Treatment is primarily preventive—namely, the hygiene of the mouth and other sites of focal infection. Dental disease and oral sepsis have probably become more frequent with the more widespread consumption of soft foods, and it may be that rheumatoid arthritis has correspondingly increased; on the other hand, the school clinics for dental treatment and the removal of tonsils and adenoids are a step in the direction of preventive medicine and should exert a neutralizing effect. Removal of teeth with apical infection is obviously essential, and, as already mentioned, all affected teeth should be removed, otherwise the arthritis may continue and the result be disappointing. The patient should be warned that the extraction may be followed by a temporary aggravation of the arth-

ritis; general infection may result, and in a recent case the possibility that the preliminary injection of a local anaesthetic had favoured this complication by more widespread damage to the tissues was raised. Whether or not the affected teeth should all be removed at one sitting or extracted in relays should be decided in each case by consideration of the patient's condition and to some extent by the number of the teeth affected; leucopenia has been regarded as a sign of diminished resistance. (K. Goadby; J. A. Toren) and an indication that not more than one tooth should be removed at a time. Removal of dead teeth requires careful consideration; dead pulps favour persistence of infection and so arthritis; Izod Bennett emphasizes the responsibility in this respect of dental surgeons who kill sensitive pulps for the relief of pain. Curetting of an infected uterus is dangerous, as it may spread the infection.

Before vaccine treatment is commenced infective foci that can be dealt with, such as the teeth and tonsils, should be removed. Autogenous, not stock, vaccines should be employed, and sensitized vaccines have their advocates. When more than one organism is suspected to be responsible for the arthritis, it has been suggested that monovalent vaccines from them should be given so as to recognize the causal one by reaction in the joints; but mixed vaccines may be necessary. Vaccine therapy is often combined with, and said to be helped by, diathermy and ultra-violet radiation (Billington). Crowe's results with his *Micrococcus deformans* vaccine showed that 70 per cent. of sixty-two patients were cured for the time, and that fifteen of these or 25 per cent. of the total number, were known to remain so.

Intestinal auto-intoxication has been attacked by many disinfecting drugs, especially guaiacol. In cases with achylia gastrica hydrochloric acid by the mouth is a logical procedure in inhibiting bacterial activity in the alimentary canal, and stasis has naturally been met by purgatives—paraffin and so forth. Sulphur is an old intestinal antiseptic; intramuscular injections of sulphur in oil have been given by Reimann and Pucher, who are somewhat cautious in their estimate of the effects; and of organic sulphur compounds, contramine and thergarmine have been recommended from a different standpoint by McDonagh, who says that their effect is as strik-

ing as that of insulin in diabetes, but that their oral administration is ineffectual.

Thyroid extract and arsenic, as in so many obscure conditions, have been given, and may do good by speeding up metabolism, which Pemberton believes to be lowered as regards carbohydrates. On the other hand, parathyroid, the action of which is antagonistic, not complementary, to that of thyroid extract, has been found to be beneficial (Grove and Vines), and is said to act by correcting the disturbance of the endocrine balance between the thyroid and the parathyroid, in which the parathyroid becomes subordinate, with calcium deficiency which is due to chronic infection (Vines). The number of drugs that have been given is long; it includes iodine as a tincture or in collosol form by the mouth, or intravenously, and collosol preparations of sulphur and manganese. It has been suggested that iodine does good merely by improving the condition of the thyroid and relieving subthyroidism, which favours arthritis (Llewellyn, 1925). Pemberton, finding that there is a lowered sugar tolerance more or less in proportion to the severity of the arthritis, has employed a dietetic treatment based on restriction of carbohydrates and a reduction of the total caloric value of the food intake, with due attention to the state of general nutrition. As regards diet, Llewellyn Jones in 1909 insisted on the mistake, due to confusion with gout, of restricting meat, but in the absence of dyspepsia did not restrict the carbohydrate diet.

An important point in treatment, which the orthopaedic surgeons have impressed upon us, and on which Sir Robert Jones will no doubt lay stress, is the prevention of permanent deformities from the adoption of bad positions of the limbs and trunk during the acute stages and exacerbations; as has been well said by Russell, the price paid by the patient for comfort during the acute phase is that of becoming a cripple for life. Unless carefully supervised, complete immobilization of the painful joint, by plaster or splints, may lead to troublesome fixation of the articulation.

The good effects of *heliotherapy and ultra-violet radiation*, natural or artificial, are explained in various ways—namely, by increasing the bactericidal power of the blood and so raising the resistance to infection (Rollier; Colebrook, Eidinow, and Leonard Hill), or also by

speeding up metabolism. Other forms of external treatment—by massage, heat, and hydrotherapy, such as whirlpool baths—do good by increasing the supply of blood to the joint, thus improving the local resistance and so possibly killing off the local infection, and it has been suggested that this is due to the increased oxidation processes thus favoured (Pemberton).

Protein Shock Therapy.—The intravenous injection of foreign protein in various forms, such as Witte's peptone (Auld), milk, and especially T.A.B. vaccine, so as to produce a relatively severe reaction (protein shock) has been employed with some success—at any rate for a time—in rheumatoid arthritis. Cruickshank has obtained encouraging results from the intramuscular injection of 0.3 to 0.6 gram of peptone in solution on four or five occasions at weekly intervals so as to give rise to a temperature of 101° F. Draper (1920) suggests that the good effects of the domestic remedy bees' stings in rheumatoid arthritis are due to protein shock therapy. Campbell has treated 100 cases, seventy of which, up to November, 1923, he has analyzed; of these seventy there was no improvement in twelve; in fifty-eight benefit was obtained so that forty of them were in work without relapse after periods of one to three and a half years, while sixteen, and possibly two that had been lost sight of, had relapsed. As the infection may be inhibited only and not abolished by protein shock therapy, he suggests that it may be wise to give one or two more injections after the active phase has disappeared.

QUESTIONS FOR DISCUSSION

The following points may be suggested for discussion:

- 1.—Is rheumatoid arthritis always infective in origin?
- 2.—What is the relation of tuberculosis elsewhere to chronic arthritis?
- 3.—What share do constitution and disorders of metabolism take in its causation?
- 4.—Are the arthritic and endocrine disorders both due to infection, or does metabolic disorder sometimes precede and dispose to infective arthritis?
- 5.—Treatment by endocrine therapy, dietetic modifications, and protein shock?

REFERENCES

- AULD, A. G., *Brit. Med. Jour.*, 1918, i, 195. BEDDARD, A. P., *Trans. Med. Soc. London*, 1919, xlii, 20. BENNETT, T. IZOD, *The Stomach and Upper Alimentary*

- Canal in Health and Disease*, p. 43, 1925. BILLINGS, F., *Focal Infections*, New York, 1906. BILLINGTON, S. G., AND CRABBE, S., *Brit. Med. Jour.*, 1924, i, 1087. BROCK, S., Papers from the Mayo Foundation and Medical School of Minnesota, Philadelphia, 1921-22, 502. BRYANT, J., *Boston Med. and Surg. Jour.*, 1915, clxxii, 321. BYFIELD, A. H., *Amer. Jour. Dis. Child.*, 1920, xix, 87. CALOT, F., *Monde méd.*, Paris, 1924, xxxv, 249. CAMPBELL, A., Quoted by Sequeira and O'Donovan, *Lancet*, 1925, i, 909. CAMPBELL, D., *Glasgow Med. Jour.*, 1925, ciii, 79. CASSIDY, M., *Proc. Roy. Soc. Med.*, 1923-24, xvii, 4. COATES, V., AND GORDON, R. G., *Brit. Med. Jour.*, 1923, ii, 560. COLEBROOK, L., EIDINOW, A., AND HILL, L., *Brit. Jour. Exper. Path.*, 1924, v, 51. CROOKSHANK, F. G., *New York Med. Jour. and Record*, 1925, exxi, 615. CRUIKSHANK, J. N., *Ibid.*, 1925, cxxi, 621. CROWE, H. W., *British Med. Jour.*, 1920, ii, 815. DOR, L., *Gaz. méd. de Paris*, 1893, 2e sér., viii, 556. DRAPER, G., *Amer. Jour. Med. Sci.*, 1920, cix, 370. *Idem, Human Constitution*, 1924, p. 24. EUSTERMAN, G. B., *Ann. Clin. Med.*, Baltimore, 1924, iii, 394. EUSTERMAN, M. F., *Dental Cosmos*, Philadelphia, 1921, lxiii, 901. FABER, K., *Berl. klin. Woch.*, 1913, L (i), 958. GARROD, A. B., *Treatise on Gout and Rheumatic Gout (Rheumatoid Arthritis)*, third edition, London, 1876. GARROD, A. E., *System of Medicine* (Allbutt and Rolleston), 1907, iii, 7. *Idem, Proc. Roy. Soc. Med.*, 1923-24, xvii, 1. GARROD, A. E., AND EVANS, G., *Quart. Jour. Med.*, Oxford, 1923-24, vii, 171. GOLDTHWAITE, J. E., *Boston Med. and Surg. Jour.*, 1915, clxxii, 881. GROVE, W. R., AND VINES, H. W. C., *Brit. Med. Jour.*, 1922, i, 791. GUIARD, Y., *Thèse de Paris*, 1908. HADEN, R. L., Quoted by G. B. Eusterman. HALL, PERCY, *Ultra-Violet Rays in the Treatment and Cure of Disease*, 1924, p. 73. HASTINGS, T. W., *Jour. Exper. Med.*, New York, 1914, xx, 52. HURST, A. F., AND BELL, J. R., *Lancet*, 1923, i, 111. *Idem, Brain*, 1922, xlvi, 266. JOBLING, J. W., AND PETERSEN, W. F., *Jour. Amer. Med. Assoc.*, 1916, lxvi, 1753. JONES, R., *LLEWELLYN, Arthritis Deformans*, Bristol, 1909. LACKUM, W. H. von, Quoted by G. B. Eusterman. LATHAM, P. W., *Croonian Lectures*, Roy. Coll. Physicians, *Lancet*, 1886, i, 673; and *Lancet*, 1918, i, 781. LÉOPOLD-LÉVI ET ROTHSCHILD, *Bull. et Mém. Soc. Méd. des Hôp. de Paris*, 1908, 3e sér., xxv, 585. LÉRI, A., *Presse méd.*, Paris, 1922, xxx, 13. LILLIE, H. I., AND LYONS, H. R., *Jour. Amer. Med. Assoc.*, 1919, lxxii, 1214. LLEWELLYN, Lt. J., *Franco-Brit. Med. Rev.*, 1925, i, 205; *New York Med. Jour. and Record*, 1925, exxi; *Lancet*, 1925, i, 1203. McCARRISON, R., *The Thyroid Gland in Health and Disease*, p. 50, 1917. MCCRAE, T., *Canadian Med. Assoc. Jour.*, 1917, vii, 385. McDONAGH, J. E. R., *Med. Press and Circ.*, 1924, N.S., exvii, 359. MEISNER, J. G., Quoted by G. B. Eusterman. MOENCH, L. M., *Collected Papers of the Mayo Clinic*, 1923, xv, 993. MOURIQUAND, G., ET MICHEL, P., *Traité de pathologie médicale et de thérapeutique appliquée* (Sargent, Ribadeau-Dumas et Babonneix), 1922, tome xxiii, pp. 524, 589. MUTCHE, N., *Amer. Med.*, 1915, N.S., x, 373. *Idem, Lancet*, 1921, ii, 1266. *Idem, New York Med. Jour. and Rec.*, 1925, exxi, 625. MUTCHE, N., AND MUTCHE, J., *New York Med. Jour.*, 1921, cxviii, 713. NOTT, H. W., *Brit. Med. Jour.*, 1925, i, 443. PEMBERTON, R., *Amer. Jour. Med. Sci.*, 1914, cxlvii, 111, 265, 423. *Idem, ibid.*, 1921, clxi, 517. *Idem, ibid.*, 1925, clxix, 485. PETERSEN, W. F., *Arch. Int. Med.*, Chicago, 1917, xix, 1042; 1917, xx, 515, 716. PHILLIPS, J., *Cleveland Med. Jour.*, 1910, ix, 686. PLATT, H., *Lancet*, 1925, i, 791. REIMANN, H. A., AND PUCHER, G. W., *Amer. Jour. Med. Sci.*, 1924, clxviii, 77. SERGENT, E., *Bull. et Mém. Soc. Méd. des Hôp. de Paris*, 1908, 3e sér., xxv, 716. STOCKMAN, R., *Glasgow Med. Jour.*, 1925, ciii, 73. THOMPSON, H. K., *Boston Med. and Surg. Jour.*, 1925, cxvii, 658. TOREN, J. A., *Dental Cosmos*, Philadelphia, 1921, lxiii, 492. UMBER, *Muench. med. Woch.*, 1924, lxxi, 4. VINES, H. W. C., *Brit. Med. Jour.*, 1923, ii, 854. WATSON-WILLIAMS, P., *Brit. Med. Jour.*, 1922, i, 88. *Idem, Proc. Roy. Soc. Med.*, 1923, xvi (Sect. Odont.), 35. WILLCOX, W. H., *Brit. Med. Jour.*, 1921, i, 804. *Idem, Brit. Dental Jour.*, 1923, xliv, 537.

TUMOURS OF THE LARGE BOWEL

A. PRIMROSE, C.B., M.B., C.M., F.R.C.S. (Eng.)

Professor of Clinical Surgery and Dean of the Medical Faculty, University of Toronto

THE discovery of a mass or tumour in the large bowel demands careful study on the part of the medical attendant. Certain of these are produced as manifestations of acute inflammatory disease, the most common example of which is found in the ileo-caecal region during the progress of an appendicitis; such a tumour is due to oedema and suppuration. Again a tumour of the large bowel may be of sudden production as in intussusception. Tumours of gradual production and development may result from a variety of causes of which the most common are tuberculosis, actinomycosis, diverticulitis and new growth. The present paper is concerned with diverticulitis and new growth. The writer has studied 107 cases taken from his private records, a summary of which is as follows:—

Rectum cancer of.....	41
Sigmoid cancer of.....	19
Caecum cancer of.....	7
Transverse colon cancer of.....	8
Descending colon cancer of.....	2
Ascending colon cancer of.....	1
Appendix tumours of.....	4
Inflammatory tumours of large bowel.....	12
General carcinomatosis abdominalis.....	13
 Total	 107

These cases for the purpose of the paper may be studied in the following groups:—

Cancer of the rectum.....	41
Cancer of the large bowel exclusive of the rectum	37
Tumours of the appendix.....	4
General carcinomatosis.....	13
Inflammatory tumours.....	12
 Total	 107

Age:—	Youngest years	Oldest years	Average years
Cancer of rectum.....	21	82	51.22
Cancer of the large bowel exclusive of the rectum...	33	77	57.3
General carcinomatosis....	35	82	59.
Inflammatory tumours.....	22	80	45.4

Inflammatory tumours (diverticulitis) are not uncommon in the large bowel. It is only in recent years that the etiology of such growths has been recognized. The clinical manifestations of diverticulitis have been carefully studied during the past twenty years by Bier,

Wilson, Brewer, Moynihan and many others. The congenital forms are usually found at points where blood-vessels enter, as in the epiploic tags or in the mesenteric line (Mayo). The acquired forms may occur anywhere in the intestinal wall and are more common in the sigmoid flexure and the descending colon than elsewhere. They are frequently multiple and consist primarily of herniated protrusions of the mucous membrane through the muscular coat, the serosa remaining intact as the outer covering of each diverticulum. As might be anticipated these diverticuli are not infrequently the seat of septic infection and so abscess formation or perforation may result. In this paper, however, we are mainly concerned with the fact that inflammatory thickening may occur about these diverticuli, giving rise to tumour formation and obstruction of the bowel implicated. The inflammatory thickening about a diverticulum may result in minute nodules on the bowel wall, in many instances not larger than a millet seed or a grain of rice. These small sessile bodies, particularly when they are multiple, may resemble at operation the little tubercles which are commonly found studded over the serosa in tuberculous peritonitis, or again they may be mistaken for the conditions found in general abdominal carcinomatosis. The writer has examined such small nodules under the microscope and has thus demonstrated the diverticulum which is the cause of the inflammatory thickening round about it.

In addition to these small nodules we frequently encounter a much more serious condition, the sequence of events being as follows:— diverticuli in a localized portion of the colon become the seat of inflammatory changes resulting in a pericolitis with much fibrotic thickening; there is an inherent tendency for this mass to increase in size and in some instances tumours of large dimensions may result. When the bowel wall is surrounded by this mass obstruction slowly develops as the fibrotic mass contracts and becomes of greater

density and firmness. Occasionally these inflammatory tumours, capable of causing obstruction, are multiple. In the gross they resemble malignant growths and it is interesting to find that in certain old museum specimens labelled "cancer," mounted prior to the time when as a matter of routine the histology of all tumours was submitted to the test of microscopic study, the true nature of these growths was not discovered. Certain of these tumours have been recently subjected to histological investigation with the result that many of them have been shown to be inflammatory and not malignant. Still more important is it to recognize the fact that diverticulitis may co-exist with malignancy. Massan reports from the Mayo Clinic that 14.65 per cent. of a series of 116 patients operated upon for diverticulitis showed malignant changes at the time of operation.

The fate of these inflammatory tumours deserves careful study; under favourable conditions, even those of very large proportions may disappear spontaneously. The favourable conditions may in some instances be provided by a colostomy opening proximal to the tumour; thus keeping the bowel at rest for a prolonged period at the seat of the trouble. Moreover it becomes apparent that a permanent cure may thus become established. In the last number of *Surgery, Gynaecology and Obstetrics* (June, 1925*) I have given the detailed clinical history of two such cases; in both instances the patients remain in excellent health fifteen years after the disappearance of tumours of extraordinarily large size. In one instance a farmer at the age of forty-seven suffered intestinal obstruction because of a mass which filled the pelvis; it could be palpated above the pubis and was within easy reach of the examining finger on rectal examination. After a colostomy this man recovered, the tumour disappeared, the colostomy opening was closed and the man is still alive; at the age of sixty-two he continues to do a full day's work on the farm and enjoys perfect health. The other case, full details of which are also available in the paper referred to, was a female aged twenty-two who had a very large tumour attached to the left iliac fossa; it had been

diagnosed as sarcoma. Operation revealed a growth surrounding the sigmoid flexure of the colon, a portion of which was removed and proved histologically to be composed of inflammatory tissue only; a faecal fistula developed spontaneously, the tumour gradually disappeared, the faecal fistula closed and the patient was well four months after the operation. This patient subsequently married and has two healthy children. She is now thirty-seven years of age and has enjoyed perfect health since the operation fifteen years ago. Two other cases of more recent date were narrated in my paper, in one of which a tumour had disappeared after colostomy and the patient is now well six years after operation; in the other the tumours were multiple, they disappeared after a colectomy which was kept open for a year and then closed. The patient at present enjoys good health four years after operation.

As the study of diverticulitis and the tumours resulting therefrom is of comparatively recent date (twenty years), I thought it might be a contribution of some value to our knowledge of their life history, to record the fact that, under favourable conditions, they may disappear spontaneously and a permanent cure may result as evidenced in two of my patients who remain in excellent health fifteen years after the disappearance of massive growth. In view of the possibility of co-existing malignancy it might well be argued that the ideal operation for diverticulitis is radical removal. In all the cases referred to above radical operation of that nature was impossible. It therefore remains an interesting fact that in a large percentage of these cases a permanent cure may be effected by simple means.

Cancer of the rectum.—I do not propose to study this subject at length but will record a few observations as a result of the clinical study of my cases. The condition is curable if operated upon at an early stage of its development. The prognosis of cancer of the rectum in this respect does not differ from that of cancer in other parts of the body, e.g. the breast or the buccal cavity. Moreover, in virtue of the fact that these cases do not metastasise early, a comparatively simple operation, with wide removal of the primary growth will effect a cure in early cases, where the disease is still localized to the rectum and has not invaded the

*Massive tumours due to diverticulitis of the large bowel.—A. Primrose, vol. xl, June, 1925, p. 825.

peri-rectal tissues. It therefore becomes imperative to recognize the growth early. Unfortunately the disease may progress greatly before any very serious symptoms have manifested themselves and the medical practitioner and the patient may both be misled. It is characteristic of malignancy in all parts of the body that where the growth is capable of extending without interfering with the function of the part affected, it may develop extensively before it is discovered. A striking example of this is found in the stomach. A cancer in the body of the stomach often reaches very large dimensions before it produces any symptoms whatever, but if a cancer appears at the pylorus, gastric stasis is produced early and symptoms of serious trouble soon manifest themselves. So too malignant disease may extensively invade the caecal wall without producing untoward symptoms. One kidney may be the seat of a large malignant growth which has only been diagnosed when a tumour is accidentally discovered. In the rectum, in virtue of its cubic capacity, a growth may attain large size before obstructive symptoms occur. Rectal cancer, however, tends to ulcerate and bleeding occurs. Here we have an early symptom which may often give a clue to a correct diagnosis. Most people suffer from piles to a greater or less degree and hence the popular belief that fresh blood in the stools is indicative of what is generally described by the laity as "bleeding piles." A remarkably large percentage of my cases of rectal cancer, and I am sure my experience is not exceptional, have come to me stating that they have been treated by some medical practitioner for "bleeding piles." Thus most valuable time is lost and the prospect of a radical cure may have been sacrificed. It should therefore be an unbroken rule of practice to make a thorough digital examination of the rectum, as high as one can reach, in every case where blood is passed in the stools. Diarrhoea and tenesmus may also supervene, and the patient sometimes complains of a dull ache referred to the perineum and the sacral region. Eventually obstruction is established.

It is an undoubted fact that by far the largest number of cases of cancer of the rectum remain undiscovered until it is too late to effect a cure. Every effort therefore should be made

to instruct the laity, so that they may not overlook symptoms which might appear to them trivial. On the other hand the practitioner should be thorough in his examination of all rectal cases.

The modern radical treatment of cancer by operation postulates the removal of the primary focus of disease, along with the lymphatic channels and the lymph glands which drain the affected area and which may be the seat of secondary tumour formation. This principle is, for example, carried out universally to-day in the surgical treatment of cancer of the breast but it is a very different problem when we come to deal with cancer of the rectum, where we find it difficult to apply these principles of the radical treatment of malignant disease. The splendid work of Mr. Alexander Miles has demonstrated the necessary minimum scope of a radical operation, including as it does the resection of the affected portion of the bowel and the dissection of the lymph glands and gland bearing fascia not only in the mesentery but in the ischio-rectal fossa of the perineum. This extensive operation, as conducted by Miles, is of the combined abdomino-perineal type with the establishment of a permanent colostomy. The operative mortality in such operations is very high, estimated by various surgeons from 15 to 60 per cent. It can be shown that in very early cases a cure may be effected by much less radical means, while in advanced cases such a radical operation holds out little prospect of success. Personally I have come to the conclusion that resection of the bowel alone is the operation for choice in early cases, while in advanced cases one may use one's judgment as to whether or not the complete radical procedure of Miles should be carried out.

The value of radium and deep x-ray therapy has not yet been determined. Certain inoperable cases under my care have been subjected to such treatment with very positive results, causing the tumour growth to diminish or to disappear entirely as far as one's observation was capable of determining. In five instances where beneficial results were obtained from radium treatment, the growth eventually recurred and a fatal issue ensued. One of these cases is worth recording: a man fifty-five years of age, a school teacher, was seen by me in

consultation suffering from a large cauliflower-like growth in the rectum, fixed and inoperable. He was subjected to radium and high voltage x-ray treatment with a result which was apparently ideal; the growth entirely disappeared. He was then persuaded by his friends to visit one of the best known clinics in the United States where he was subjected to a very thorough examination. He was told that no growth existed and further, the examining clinician expressed the view that he could not believe he had ever had a growth! This man returned to Toronto and told his story; he died eighteen months subsequently with recurrent cancer in the rectum.

One's attitude towards radium and deep x-ray therapy in malignant disease of the rectum and in malignant disease elsewhere is one of expectancy. Beyond all question we know that the growth of the cancer cell is profoundly influenced and often destroyed by radiation. There is, however, a residuum left which seems difficult or well-nigh impossible to eradicate. Thus far in rectal cancer I know of no permanent cures. We have a group of earnest, highly qualified, specialists working in this field; they have not as yet arrived at definite conclusions but a study of their activities thus far gives us hope that ere long the curative effect of radiation will be enhanced by determining more effective methods in the use of these measures. We can, at this juncture, express our admiration for the determined effort made by our specialists in radium and x-ray therapy. We should do all in our power to assist and encourage them in their work; the prospect of ultimate success is most favourable.

Cancer of the large bowel, exclusive of the rectum.—The outlook in these cases is much more favourable; in fact if early radical treatment is carried out the prospect of effecting a radical cure is quite as favourable as it is in malignant disease elsewhere in the body. The fact remains that in many instances the disease is far advanced before relief is sought.

It is an undoubted fact that the early symptoms may be overlooked by the medical attendant. The incomplete obstruction of which these patients frequently complain may often be relieved by mild catharsis, and so patient and the medical attendant are lulled into a position of false security, with the result that valuable

time is lost. We would, therefore, urge most careful investigation of all patients, particularly at the cancer age, who begin to show signs of obstruction. The discovery of a mass or tumour on examining the abdomen as a rule demands a laparotomy. Blood in the stool suggests serious trouble; its source should never be left a matter of mere conjecture; these malignant growths tend to ulcerate, and haemorrhage from the bowel not infrequently antedates the onset of obstruction. The study of x-ray plates after a barium meal is invaluable in assisting us to establish a diagnosis.

The bowel proximal to the seat of the growth becomes distended and if the obstruction is slowly produced the muscularis becomes hypertrophied. When the obstruction is low down, e.g. in the sigmoid, the distension of the bowel above may stop suddenly at the ileo-caecal valve or it may extend into the ileum. Even in complete obstruction with enormous distension of the proximal colon the distension may be restricted to the large bowel. This depends upon the efficiency of the ileo-caecal valve (ileo-caecal sphincter). When the valve is efficient the small intestine is capable of pumping large quantities of fluid material or semi-fluid material into the distended bowel against great resistance, and no regurgitation occurs. On the other hand, if the valve is inefficient the small bowel becomes distended. In the latter case vomiting is sure to be an urgent symptom but where the distension is confined to the large bowel we frequently note the absence of vomiting. One has often had the opportunity of verifying these facts regarding distension on the operating table. My main object in referring to it is to emphasize the importance of noting that vomiting, an early symptom in most cases of acute obstruction may be absent in cancer of the large bowel.

Loss of weight is always a late symptom which, while it is important to note its occurrence, is of little value in helping us to arrive at a diagnosis. Pain coming on suddenly and acutely, of an intermittent type, is characteristic of obstruction in the large bowel. In some instances visible peristalsis is noted but it is absent where the distension has assumed large proportions.

As to treatment I would like to urge that no routine method should be advocated as appli-

eable to all cases. The surgeon who opens the abdomen to-day should never be the slave of any "routine." He should be prepared to deal with conditions as he finds them, without any preconceived determination to perform a particular type of operation. There are many methods of dealing with such cases and the procedure in the individual case should only be determined when the abdomen is opened and precise information gained as to the conditions present. Conditions may warrant the excision of the growth and attached mesentery and an immediate end to end anastomosis with closure of the abdomen without drainage. In certain advanced cases it may be impossible to remove the disease, particularly where, in addition to extensive local trouble, there are metastatic growths elsewhere, e.g. in the liver. In such cases it may be possible to perform a lateral anastomosis to short circuit and relieve obstruction; or, if the disease is low down in the pelvic colon, to perform a colostomy. In many cases, particularly in acute obstruction or in the presence of abscess formation, one has found the two-stage Mikulicz operation of inestimable value.

General carcinomatosis abdominalis.—This condition is almost invariably secondary to a primary focus situated within the abdominal cavity. Moreover, by far the most fertile source is a primary malignant papilloma of the ovary. It is significant that every one of the series of thirteen cases reported in this series occurred in the female.

It is very remarkable to note possibilities as to the prolongation of life in certain of these cases. Thus Mrs. O. N., *aet.* thirty-six, was seen by me in 1909. A year previously a laparotomy had been performed and an inoperable malignant mass was found in the pelvis. She developed a general carcinomatosis with ascites and I drew off a large amount of ascitic fluid. In subsequent months I tapped the peritoneal cavity many times, drawing off from eight to twenty-four quarts of fluid each time; numerous masses were noted as the fluid was withdrawn. She died in June, 1914. In other words she lived for six years after the first discovery of an inoperable tumour. It is also worthy of note that morphia was administered in large quantities for the relief of pain. She actually took one grain of morphia every two

hours for two years immediately preceding her death, twelve grains a day or a total of grs. 4,380 in two years. Under morphia she enjoyed a remarkable degree of comfort.

A still more remarkable case was Mrs. LeD., *aet.* fifty-eight. In December, 1908, I removed a large cauliflower mass, a papilloma of the right ovary and in addition a similar cystic mass, which had not erupted, of the left ovary. At the time of operation I could discover no implantation growths on the neighbouring serosa. The patient went west to the Pacific Coast and I saw her again, for the first time since my operation, in May, 1924, with a history that some months previously she had been operated upon in Vancouver, when an unsuccessful attempt was made to remove a malignant mass in the pelvis. For some months she had been tapped once a fortnight for free fluid in the peritoneal cavity. The patient is still alive in Toronto and is tapped regularly for her relief. This patient therefore is still alive seventeen years after the removal of a papilloma of the ovary which had erupted into the peritoneal cavity.

A third interesting case in my series was that of Mrs. T., *aet.* fifty-one, whose abdomen I opened in October, 1907. General carcinomatosis was found and the abdomen closed. A large mass developed in the pelvis. My interest in this case consisted in the experience one had as the result of an attempt to use the ascitic fluid after the manner suggested by Hodenpyle, of New York, who at that time seemed to have secured beneficial results by the subcutaneous injection of the ascitic fluid of patients suffering from carcinoma in the control of malignant disease in other patients. In my case I tried an auto-injection. Some of the ascitic fluid from her abdomen was injected under her breast. Some twelve or fifteen injections were made. As a result a tumour appeared in the right breast with a palpable mass of glands in the axilla! This experience seemed to illustrate the remarkable facility with which carcinomatous cells, in a case of carcinomatosis, may be implanted elsewhere.

It is a notorious fact that we have occasionally cases of spontaneous disappearance of general carcinomatosis with apparent permanent cure. The instances I have cited, however, illustrate a continuous process of slow develop-

ment. Moreover in view of the fact that one of my patients, whose history is recorded above, is still alive after seventeen years, it becomes questionable if we are ever sure of a cure be-

coming permanent. Possibly in these cases of apparent cure the disease remains more or less dormant and may at a future time become active and finally progress to a fatal issue.

PRIMARY PAPILLARY EPITHELIOMA OF THE URETER*

Report of a Case

HARRY D. MORSE, M.D.

Fellow in Urology, The Mayo Foundation, Rochester, Minnesota

RECENT excellent reviews on the subject of primary papillary epithelioma of the ureter have been published by Judd and Struthers, Aschner, Meeker and McCarthy, and Kretschmer. The tumours of epithelial origin comprise the majority of the primary tumours and of these the papillary epitheliomas predominate. Kretschmer gives the proportion of nineteen cases of papillary carcinoma to seventeen cases of other types of carcinoma. Most authors make a clear-cut distinction between benign papilloma and papillary carcinoma. That such distinction cannot always be relied on is emphasized by a case reported by Thomson-Walker in 1921 in which the tumour was diagnosed as a simple villous papilloma and the patient died five months after operation from metastasis to the abdomen, including the liver.

A man, aged fifty-four, registered at the Mayo Clinic, May 5, 1922, with a history of having had for a year, severe pain in the right lumbar region radiating anteriorly and downward to the genitals. In June, 1921, the pain was associated with marked dysuria and occasionally total haematuria. In August, 1921, on cystoscopic examination, a small stone was removed from the bladder. Since then the patient had had several similar attacks of pain, and for the last two weeks it had been constant in the right groin and suprapubic area.

*Submitted for publication, May 12, 1925.

†In this paper the amounts of albumin, red blood cells, and of pus in the urine are graded by the figures "1" to "4". For the degree of dilatation of the renal pelvis, the extent of enlargement of the prostate, and the degree of malignancy of the tumour the same symbols are used. [EDITOR].

The systolic blood pressure was 114, the diastolic 68. The specific gravity of the urine was 1.011; it was acid in reaction, contained albumin 1,† red blood corpuscles 2, and pus 1. The phenolsulphonephthalein return was 65 per cent. The haemoglobin was 75 per cent. The Wassermann reaction was negative. Roentgenograms of the kidneys, ureters, and bladder were negative. On cystoscopy the bladder was found to be normal, and the prostate gland moderately enlarged. Both ureteral orifices were normal in appearance and the urine secreted was clear. Both ureters were catheterized without difficulty. The differential function was normal and the collected specimens of urine negative. A right pyeloureterogram was made which showed dilatation, 1, of the pelvis and calyces. It was concluded that a renal calculus had probably passed during the attack of colic previous to the examination. Following cystoscopy the patient had a very marked reaction and passed bloody urine for two days.

The patient returned to the clinic August 8, 1924. He had been perfectly well until two months previous to his return, when he noticed a backache located low across the hips, more on the right side, and radiating slightly down both legs. There was no history of trauma or strain. One month before while taking baths for his backache, he had had a painless total haematuria with the passage of clots. His weight and strength had decreased markedly in the last two months and he walked with a cane.

The systolic blood pressure was 110 and the

diastolic 70. There was a moderate degree of peripheral arteriosclerosis present. The prostate, by rectum, was enlarged, 2, and benign in character. The specific gravity of the urine was 1.013; it was acid in reaction, and contained albumin 1, red blood corpuscles 2, and pus 1. The phenolsulphonephthalein return was 50 per cent., and the blood urea 30 mg. for

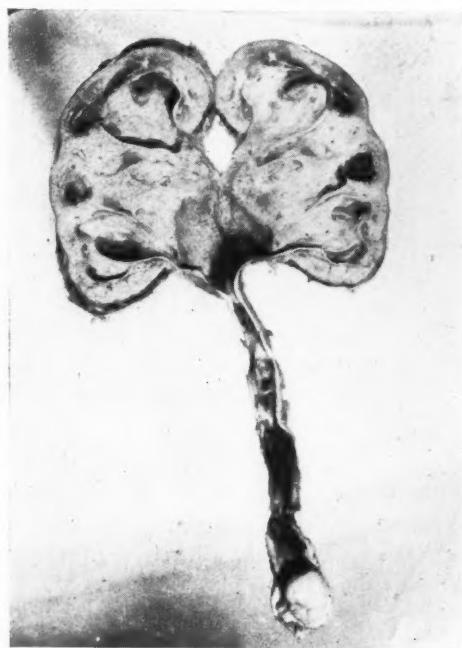


FIG. 1.—Kidney and ureter opened showing the intrarenal distension of pelvis, thinning of the cortical substance, and absence of other tumours.

each 100 cc. The haemoglobin was 70 per cent., the erythrocytes numbered 4,320,000, and the leukocytes 6,300. The Wassermann reaction was negative. The roentgenograms of the kidneys, ureters and bladder were negative. Cystoscopy showed that the prostate was enlarged 2, and surrounding the area of the right ureteral orifice which was not seen, was an area of fullness covered with short fine tags, suggesting inflammatory reaction rather than malignancy. A specimen of tissue was removed for diagnosis and was found to be papillary epithelioma, grade 3.

Suprapubic cystostomy was performed. No break in the mucous membrane was found, but the enlarged prostate was removed together with a portion of the mucous membrane from the right base in the region of the ureteral

orifice. The pathologist reported adenomatous hypertrophy of the prostate, and inflammatory mucous membrane. The patient recovered uneventfully and was dismissed from the hospital on the twenty-second day after operation.

November 11, 1924, the patient again returned to the clinic with the history of intermittent total haematuria since his operation, and of having passed a large quantity of what he termed pure blood four days before. The pain low down in his back had persisted. Examina-

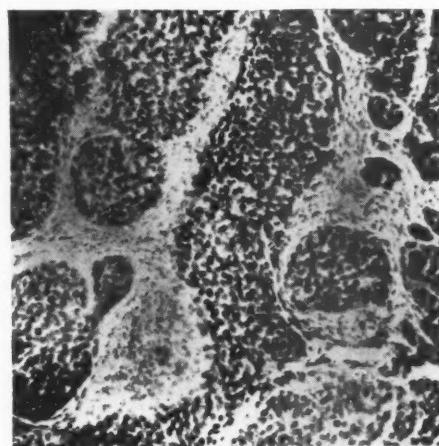


FIG. II.—Low power showing arrangement of stroma and cellular elements.

tion was essentially as previously. The specific gravity of urine was 1.010, with albumin 2, red blood corpuscles 3, and pus 1. The haemoglobin was 70 per cent., erythrocytes numbered 4,250,000, and leukocytes 9,200. The blood urea was 26 mg. for each 100 cc.

Cystoscopic examination disclosed marked scarring of the right base of the bladder, but no evidence of neoplasm. The right ureteral orifice was of the "golf hole" type, from which protruded a blood clot. On removal of the blood clot no secretion was seen. A specimen-taker inserted through the cystoscope was passed up the right ureter and a specimen of tissue removed for examination. A ureteral catheter was then passed up the ureter for a distance of 5 cm. where an impassable obstruction was met. Sodium iodide was injected and a roentgenogram was taken which did not show evidence of the medium above the obstruction. The pathological diagnosis on the specimen removed was papillary epithelioma, grade 3.

November 19th, a nephro-ureterectomy was performed. The kidney and ureter were removed as one. There was marked intrarenal hematuria, with thinning and atrophy of the cortical substance of the kidney. The extrarenal pelvis and ureter were moderately dilated but the mucous membrane was smooth with the exception of the lower ureter, where, 5 cm. from the bladder, was found a pedunculated papilloma measuring 1.5 by 1 by 1 cm., completely filling the lumen of the ureter (Fig. I.).

Microscopically this tumour was found to be composed of epithelial cells supported by a small amount of fibrous connective tissue. The

majority of the epithelial cells showed slight differentiation; there were numerous mitotic figures (Fig. II.).

BIBLIOGRAPHY

- (1) ASCHNER, P. W., Primary tumours of the ureter, *Surg., Gynec. and Obst.*, 1922, xxxv, 749-758. (2) JUDD, E. S. AND STRUTHERS, J. E., Primary carcinoma of the ureter. Review of the literature and report of a case. *Jour. Urol.*, 1921, vi, 115-124. (3) KRETSCHMER, H. L., Primary carcinoma of the ureter, with a report of a case and a review of the literature. *Surg., Gynec. and Obst.*, 1924, xxxviii, 47-51. (4) MEEKER, LOUISE H. AND McCARTHY, J. F., Primary carcinoma of the ureter. Report of a case, with a review of the literature. *Jour. Am. Med. Assn.*, 1923, lxxxii, 104-109. (5) WALKER, T., Discussion of paper by KIDD F., Specimen from case of carcinoma of the ureter, secondary to carcinoma of a congenital hydronephrotic kidney. *Proc. Roy. Soc. Med. (Section of Urology)*, 1921, xiv, pt. 3, 42.

DEFICIENCY DISEASES OF CHILDREN*

FREDERICK F. TISDALE, M.B., (Tor.)

THE name "deficiency disease" is usually applied to a group of diseases which are caused by a lack in the diet of some one of the various vitamines. In this respect the name is a misnomer. It would be just as rational to consider as deficiency diseases those diseases which are caused by a lack in the diet of any substance. We could quite rightly designate as deficiency diseases the anaemias which are due to a lack of iron or the abnormalities of the thyroid which result from a lack of iodine, yet these conditions are usually not considered under this heading. By common usage the name is reserved for those conditions which are intimately associated with a deficiency in the diet of any one of the various vitamines. To-day I wish to direct your attention to three of the so-called deficiency diseases which are most frequently encountered in infants and children, namely—rickets, tetany, and scurvy.

Rickets.—This is probably more frequently encountered than any other disease of infancy and I may add, its presence is probably more frequently overlooked than any other condition. The disease occurs in both breast fed and artificially fed infants. It involves not only the

osseous system but also other parts of the body particularly the nervous and muscular systems. The earliest manifestations of the disease are restlessness, head sweating, and tossing of the head from side to side when asleep. Shortly after this the earliest bone changes may be found. Craniotabes or soft areas in the occipital and posterior part of the parietal bones may be felt if firm pressure is used. Beading of the ribs, or the so-called rachitic rosary which is due to an enlargement of the junction of the bony and cartilaginous portions of the ribs, may be quite readily felt. Later, the other bony changes appear; the enlargement of the epiphyses at the wrists and ankles, the prominent forehead with enlargement of the frontal bosses, the enlargement of the parietal bosses, the flattening of the occipital region of the head, and a general softening of all the bones. The anterior fontanelle is larger than normal and this combined with the enlargement of the frontal and parietal bosses produces the so-called "hot cross bun" appearance of the head. Figure 1 illustrates many of these changes. The dentition is delayed. There is marked loss of tone of the muscles and ligaments. The infant does not sit up at the usual age of seven months or stand at the end of the first year. If the infant has been walking it may stop doing so. The abdo-

*From the Hospital for Sick Children, Toronto.
Read before the Annual Meeting of the Ontario Medical Society, Toronto, May, 1925.

men becomes quite large. As a result of the softness of the bones, and the lack of tone of the muscles and ligaments the well known deformities of the chest, spine and extremities may appear.

Not in all infants do the nervous manifesta-

readily than the normal infant and the outlook is not as favourable. This most important aspect of rickets deserves our careful consideration.

The age and seasonal incidence of rickets is quite definitely defined. The disease may be recognized clinically as early as the second



FIG. 1.

tions of the disease appear as prominently as those before mentioned; still they do occur with sufficient frequency to warrant the emphasis which has been placed on them. The most important changes produced in infants by rickets are not the before-mentioned conditions but a resultant general lack of resistance to infection. There is no doubt that this general lack of resistance caused by rickets is a very great factor in our infant mortality. The rachitic infants are usually anaemic. They develop head colds, otitis media, bronchitis, and pneumonia more



FIG. 2.

month. The period of greatest incidence however is from the third month to the end of the first year. It may be fairly prevalent in the first half of the second year but after the second year it is quite unusual to encounter active rickets. In Ontario the disease occurs most frequently in the winter and spring months, from November to May.

The etiology, treatment, and prevention of rickets will be discussed with the next disease that I wish to present for your consideration, namely, tetany.

Tetany.—Infantile tetany is encountered fairly frequently at certain seasons of the year.

Convulsions are the predominant symptom. In certain cases they may occur as often as thirty or forty times a day. The next symptom and one which is almost invariably overlooked is a peculiar inspiratory crow produced when the child cries, and caused by a spasm of the larynx. Some authors consider this laryngeal spasm as a separate disease but it is only one of the symptoms of tetany. Chvostek's sign, which is a contraction of the facial muscles and is elicited by tapping the side of the cheek is almost invariably present in infants with tetany. It is due to a hyperirritability of the facial muscles. This sign is of no significance in infants over two years of age. A characteristic position of the hand (carpopedal spasm) is present in a moderate percentage of cases. Sometimes this position of the hand may be produced by a constriction of the arm for one or two minutes as illustrated in Figure 2. When the spasm is produced in this manner it is called Rousseau's sign. The before-mentioned five symptoms of tetany, namely — convulsions, laryngospasm, Chvostek's sign, carpopedal spasm, and Rousseau's sign, are all due to a hyperirritability of the neuro-muscular system.

The age incidence and seasonal incidence of tetany is singularly striking. Of the cases encountered at the Hospital for Sick Children during the past six years 80 per cent of them occurred at the fifth, sixth, seventh, eighth and ninth months of age, and 85 per cent. occurred in the months of January to May inclusive; the highest incidence was in March and April. It is evident that the age, and seasonal incidence of the disease are indeed most striking.

The blood changes in rickets and tetany are quite definite. It has been shown at the various clinics here and in the States that in rickets the inorganic phosphorus of the blood is reduced while in tetany it is the calcium of the blood that is reduced. When it is remembered that over 90 per cent. of the inorganic portion of bone is tertiary calcium phosphate, the reason for the defective formation of bone in rickets is at once evident. In the production of tetany the important factor is the ratio of the sedative to irritating salts in the body. There is in the normal infant a constant ratio between the irritating sodium and potassium salts and the sedative calcium and magnesium salts. In tetany this ratio is disturbed by a reduction of the

sedative calcium salt. This results in a hyperirritability of the neuro-muscular system which accounts for all the symptoms of the disease.

The cause of rickets and tetany is intimately associated with a lack of the anti-rachitic vitamin (or anti-rachitic substance) whatever that may be. Why there is in one case a reduction of inorganic phosphorus in the blood, with the production of rickets, and in another a reduction of calcium with the resultant symptoms of tetany, we cannot say. We know, however, that when an adequate supply of this anti-rachitic substance is given, that rickets and tetany will not develop. The interesting discovery has been made in recent years that exposure of the infant to ultra violet rays, which are present in the rays from a mercury vapour quartz lamp or in sunlight, produces the same effect on these inorganic elements in the blood as is produced by giving the anti-rachitic substance. Another observation of the greatest importance has been reported simultaneously in the past few months by Hess of New York and Steenbock of Wisconsin. These investigators showed that the exposure of food containing no anti-rachitic substance to ultra violet rays resulted in the production or formation in the food of the anti-rachitic substance. It is thus evident that they have actually manufactured one of the so-called vitamines.

The treatment of rickets consists in the administration of the anti-rachitic substance or exposure of the infant to direct sunlight. The anti-rachitic substance is present in large quantities in cod liver oil that has been suitably prepared. It is the pure oil that has to be given; emulsions are usually of little or no value. In many cases the anti-rachitic content of the average cod liver oil found on the druggist's shelf is very low. We have found in our experience at the Hospital for Sick Children that the best results are obtained by the use of a biologically tested Newfoundland cod liver oil. The dose is one half teaspoonful three times a day, beginning at one to two months of age and then a teaspoonful three times a day from three months of age on. This amount almost invariably prevents rickets; however occasional cases are encountered in which it is necessary to increase the dose to get the desired result. As rickets is most prevalent in the winter months it is not possible to expose much more than the infant's face to the

direct rays of the sun. There is also an added disadvantage that the ultra violet ray content of the sun's rays during the winter period is very small. Consequently in the winter months dependence should be placed almost entirely on the administration of cod liver oil. In the spring and summer months the skin of the infant should be exposed to direct sunlight. It is to be remembered that glass and clothing cut off all the beneficial rays.

In regard to tetany, the convulsions must be treated. This can be accomplished by the administration of morphin 1/40 to 1/20 grain

Cod liver oil should be started and continued for a long period, and if possible the infant exposed to the direct rays of the sun.

Scurvy.—This occurs most frequently from eight to twelve months of age. Seventy-five per cent. of the cases encountered at the Hospital for Sick Children occurred during this period. It is very rarely seen over one and half years of age. This is of considerable value in the differential diagnosis of scurvy and arthritis of rheumatic origin, as the latter condition is practically unknown under three years of age. The chief symptoms of scurvy are pain on being handled, bleeding and swelling of the gums around the teeth, blood in the urine or stools, and swelling at the ends of the long bones. The swelling is due to a haemorrhage under the periosteum. This at first glance may appear as a swelling of the joint which often leads to the mistaken diagnosis of arthritis of rheumatic origin. The x-ray appearance is shown in Figure 3. Enlargement of the costo-chondral junctions is also present, but this enlargement is more angular than found with rickets.

Scurvy is caused by a lack of the anti-scorbutic substance. This substance is contained in fresh fruit and vegetable juices. It is practically entirely destroyed by heating. The treatment of scurvy consists in the administration of one-quarter to one-half ounce of orange juice twice a day. The orange juice may be added drop by drop to the cold feeding.

Summary.—Rickets is a disease which is very frequently encountered in infants during the winter months. It involves not only the osseous system but other parts of the body particularly the nervous and muscular systems. The earliest manifestations of the disease are frequently the result of the involvement of the nervous system. The most important result of rickets is a general loss of resistance to infection. There is no doubt that this loss of resistance to infection is a very great factor in our infant mortality during the winter months. The disease can be prevented and eradicated from our province by the routine administration at one month of age of one half teaspoonful of cod liver oil three times a day. This should be increased by the third month to one teaspoonful three times a day. The cod liver oil should contain large quantities of the anti-rachitic substance or vitamine. Many specimens contain only small



FIG. 3.

hypodermically, or the rectal administration of six to eight grains of chloral hydrate or eight to ten grains of sodium bromide. Fifteen to twenty-five cubic centimetres of a sterile 8 per cent. solution of magnesium sulphate injected subcutaneously is usually quite effective. As the convulsions are a result of the low calcium content of the blood, calcium chloride should be given. The amount should be fifteen grains four or five times a day for the first two days, then the number of doses should be reduced to three a day. This should be continued for three weeks. The calcium chloride may be dissolved in a little water and placed in the feedings.

amounts. As rickets occurs in both breast fed and artificially fed infants the oil should be administered as a routine measure to every infant. As an adjunct to the above treatment the skin of the infant should be exposed, when possible, to the direct rays of the sun.

Tetany is most frequently encountered in infants from five to nine months of age, during the winter and spring months. The symptoms are: repeated convulsions, spasm of the larynx, hyperirritability of the facial muscles, and carpo-pedal spasm. The treatment of the disease has been given in detail. The means adopted for the prevention of rickets will prevent the development of tetany.

Scurvy occurs most frequently in infants from eight to twelve months of age. The most prominent symptoms are: pain on being handled,

bleeding and swelling of the gums around the teeth, and bleeding from other mucous membranes. The disease can be absolutely prevented by the daily administration to every artificially fed infant of one-quarter to one-half ounce of orange juice. This treatment should be started at four to five months of age.

Conclusion.—In view of the ease with which rickets, tetany, and scurvy can be prevented, the development of any one of these diseases in patients under our care must be regarded as a very serious reflection on our professional ability.

The author desires to acknowledge his thanks to Dr. Alan Brown, Physician-in-Chief, for permission to use the records of the Hospital for Sick Children.

A NEW TECHNIQUE IN THE APPLICATION OF THIERSCH SKIN GRAFTS*

DANIEL MCLELLAN, B.A., M.D.

Vancouver, B.C.

THE technique about to be described was first used in the case of a small boy with an extensive burn of the anterior, medial, and lateral aspects of the thigh.

An attempt was first made to apply Thiersch grafts in the usual way, direct from the donor—the child's father—to the raw surface. Under a general anaesthetic the exuberant granulations were curetted away and a large area covered. As the child was of a highly nervous temperament, it was impossible to keep him quiet, and the attempt ended in complete failure. The wound was then dressed with sterile vaseline until a week or so later, when the raw area was all clean and "quiet" again. Without doing any bacteriological examination, and without any further curettage or disturbance of the surface in any way whatever, the following method of skin grafting was used.

A strip of zinc oxide adhesive plaster one inch

wide and long enough to go completely across and adhere firmly to the skin on both sides of the raw area, was laid, with adhesive side up, on a sterile towel. Six or eight thicknesses of gauze, one inch wide and long enough to go completely across the wound, were cut and applied lengthwise to the centre of the adhesive plaster strip. With a sterile applicator, a thin layer of sterile vaseline was applied to the surface of the gauze (Fig. 1).

The area of the donor to be denuded having been blocked by a cordon of 2 per cent. novocain and adrenalin solution, a Thiersch graft was taken in the usual way. This graft was applied, raw side up, to the vaselined surface of the gauze (Fig. 2). The edges of the graft were then straightened out with a probe (Fig. 3).

Taking the adhesive by both ends, the graft was thus applied to the raw area (Fig. 4), the adhesive being stuck firmly to the good skin on each side of the wound. This was left in position for eight days, at the end of which time

*Lantern slide demonstration before the Vancouver Medical Association.

the adhesive plaster was clipped at the junction of the raw surface and the good skin. Having turned the adhesive and gauze strips back carefully, the graft was found to be adherent to the raw surface.

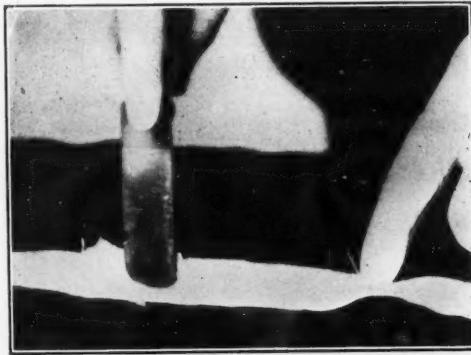


FIG. 1.

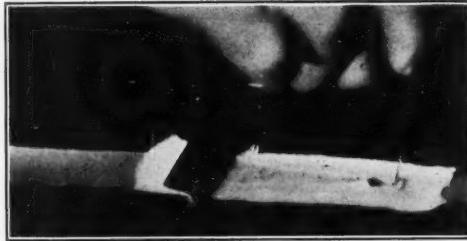


FIG. 2.

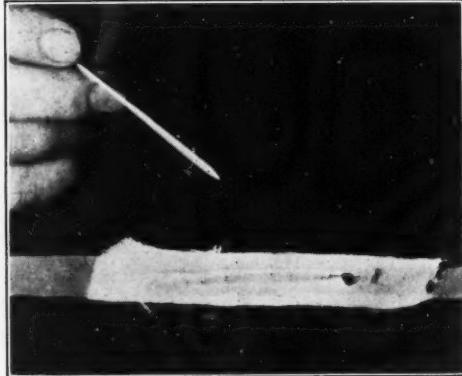


FIG. 3.

Fig. 5 shows a number of grafts in place. These grafts were taken from seven different donors, the first six all being successful. Two were taken at different times from the same donor. The patient was in blood group II; four of the donors were in group II, three in group

IV; a group compatible with group II when IV is the donor.

In the illustration, the grafts are seen some distance apart. As this was experimental, they were placed apart so as to accurately identify the grafts with the donors. If placed close together, as they should be, the heaping up of granulation between grafts will be obviated.



FIG. 4.



FIG. 5.

The tendency of a graft when taken is to curl up towards the raw surface (see Fig. 3). In my opinion infection in a skin graft begins in the rolled-up edge. If the edge is rolled up it does not take; if it does not take it dies, and must be thrown off. By this method the last ultimate edge of the graft is unrolled, leaving no place for infection. In straightening out the edge with a probe, it will be a matter of sur-

prise how much farther a graft will spread after appearing to be completely unrolled—little tongues of skin will often extend out one-eighth of an inch farther.

Points which would appear to commend this method are as follows:

1. In the positive unrolling of every particle of skin, not only is the possible focus for infection abolished, but the graft is made to cover the greatest area possible.

2. At the time of application of grafts no anaesthetic is required for the patient, as there is no pain whatever.

3. Grafts may be applied piecemeal. Many donors are perfectly willing to donate a strip of skin three inches long by one inch wide, who are not prepared to be laid up after having a large area denuded.

4. With reasonably good technique, skin-grafting by this method can be done in the patient's home.

REFERENCES

- (1) BEVAN, A. D., *Surg. Clinics of Chicago*, 1918, ii, 717. (2) SHAWAN, H. K., The Principles of Blood Grouping Applied to Skin Grafting, *Amer. Jour. Med Sc.*, 1919, clvii, 503.

THE ARREST OF LUETIC OPTIC ATROPHY BY CISTERNAL INJECTION OF MERCURY

NORMAN VINER, M.D. AND S. O. McMURTRY, M.D.

Montreal

THE progress of luetic optic atrophy—with few exceptions—to complete blindness has until very recent years been considered as an axiom in medicine. Even the apparently arrested cases—the exceptions—when followed up, ultimately shared the same fate; and with the older views of the pathology, no other outcome could be foreseen. This older view was that the condition was a primary atrophy, not secondary to inflammation, but one in which the free-floating syphilitic toxins had destroyed the retina.

Gifford¹, who has gone into this subject carefully, gives a good bibliography in which he refers to recent findings of various investigators: Karaval and Raviart who found evidence of proliferative changes in the optic nerve and its vessels: Marie and Leri, who in their examination of the optic nerves of sixty tabetics and paretics, found in those showing optic atrophy evidence of previous active inflammation in the nerves or visual tracts, and though changes were found in the retina they were convinced that they had not originated there. They concluded that the first lesion in the nerve is the ordinary peri- and endo-vasculitis of tertiary syphilis, causing secondary atrophy. An even more com-

plete investigation was made by Stargardt, who came to a similar conclusion. Though there is no record of spirochaetes having been found in the nerve itself Iggersheimer has found them four times in close relation to the nervous visual apparatus. Finally Paton, who has thoroughly considered the evidence, pro and con, is certain that the toxic theory must be abandoned.

Gifford then proceeds to review the previous methods of intensively treating cerebrospinal syphilis, showing that not only did they fail to arrest any optic atrophy already present, but that occasionally it even appeared for the first time in the course of such treatment. One of these unsuccessful methods was the injection of salvarsan into the lateral ventricles. Suker, of Chicago, conceived the idea of replacing the salvarsan by mercury in this method, and soon began to show results. In fact he has reported at least four cases of arrested optic atrophy. This method was followed by Gifford and Keegan², at first, but they afterwards adopted the cisternal route, to eliminate incision and trephining, and incidentally to obtain an even more direct approach to the optic nerve. By these two methods they treated five patients all of whom received three or four injections, all

of whom showed improvement after the first injection, and four of whom had, at the time of reporting, maintained that improvement for periods of from one to two and a half years.

As a result of his experience, upon which we based our own efforts, Gifford drew the following conclusions:—

1.—Intracranial injections of mercury bichloride have given in our hands, better results than other methods previously tried. Several cases have apparently been brought to a stand-still with useful vision for periods of one to two and a half years. A negative Wassermann has often been obtained by such treatment.

2.—Intra-cisternal injection is a relatively simple and safe procedure.

3.—Improvement in vision, especially following the first injection, as seen in five cases, is presumptive evidence of the presence of an active infiltrative process in these cases.

4.—The best results may be expected in early cases, with definite defects in part of the field, but with relatively good central vision, at least in one eye, and with little evidence of other nervous involvement.

5.—Results would not be expected in late cases, or in advanced cases of paresis. The more general the nervous involvement, even if the atrophy is not advanced, the less chance exists of stopping the process in the nerve.

Technique and Reaction.—In our cases the usual technique for cistern puncture has been followed and as soon as the cerebro-spinal fluid was tapped an adapter connected with a rubber tube attached to an open 20 cc. syringe was inserted into the needle, and about 10 cc. of the fluid allowed to run into the syringe. Ten drops of a solution of bichloride of mercury containing 1/50 of a grain of the drug was then poured into the syringe from a minim flask previously prepared. The needle was then steadied, the tube pinched and the syringe (after the plunger had been slightly inserted to prevent spilling) shaken. When it was thought that the mercury was well mixed and the froth settled down the fluid was allowed to flow back into the cistern by gravity, and the needle was withdrawn. Within a few minutes the patient began to vomit and complain of headache. This reaction usually lasted for 1—2 days and soon after the patient was back to normal.

Case 1.—C. L., carpenter, forty-four years old,

married, three children alive and well, youngest eleven years old. There was a miscarriage after the second child. History of lues many years ago. Complains of the right eye being almost blind.

Present Illness.—About nine months ago thought eyes were weak and had glasses fitted. They did little good except for reading. About six weeks ago felt right eye worse and went to have one lens changed, yet eyesight continued to fail until he was almost blind in the right eye. Complained also of pains in the legs during this period.

Present condition.—November 9 and 10, 1924. Pupils small and react to accommodation but not to light. Fitted with appropriate reading glasses. Refraction is normal. Vision of the left eye 6/5. The left eye can barely perceive two fingers at two feet. The right disc shows marked "primary" optic atrophy, the left is also quite pale. The cranial nerves except the second and third are normal. Slight Rombergism, otherwise coordination is normal. Reflexes

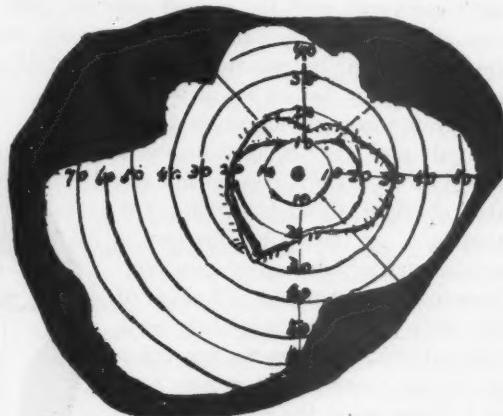


FIG. 1

normal. Motor power normal but muscles are rather toneless. Abadie's sign present.

He was advised that lumbar puncture was necessary, but procrastinated until December 4th, by which time he could no longer see two fingers with the right eye, and could barely perceive light. Spinal fluid showed Wassermann + + + +, globulin +, and sixty-four cells per emm. The visual fields charted out on December 9th in the left eye (right eye now practically blind) showed some peripheral contraction for white, and greater contraction for red and green.

On December 10th he received his first injection after having had his lunch unknown to the operator, and this intensified the reaction, so that he was very sick for three days—headache and vomiting—and incapacitated from work for



FIG. 2

a week. The remaining injections, however, were associated with the normal reaction. Before the second injection which was given on December 26th, he reported as follows: "My sight was hazy before the injection. and after reading a newspaper for a few minutes I would have to put it down. Now I see it clearly and can read it right through without any trouble." At the second injection, a preliminary withdrawal of some cerebrospinal fluid showed a cell count of 140 cells per cmm. indicating some residual irritation from the first injection. He received altogether four such injections in the course of about six weeks. Each intracisternal injection was followed a few days later by an intravenous injection of salvarsan which, with mercurial inunctions, is being continued in accordance with the usual routine for the underlying condition. This, as manifested by his general sense of well-being, is also greatly improved. His fields were again taken on February 7 and June 12, 1925 (Figs. 2 and 3), and they show a progressive increase of the visual fields for white and colours.

Case 2.—G., thirty years old, from the Ophthalmological and Neurological Clinics of

the Montreal General Hospital. Came in April 1, 1925, complaining of failing eyesight for past nine months,—rapid and progressive. Examination showed that he could perceive light, and with difficulty distinguish two fingers two feet away. The vision being so poor other measurements were useless. Except for the Argyll-Robertson pupils he showed no neurological symptoms. The spinal fluid, Wassermann cell count, and globulin were all distinctly plus.

During April he was given three intracisternal injections with the associated anti-luetic treatment, and though he denies any improvement, it is obvious that in the past two and a half months the condition has not advanced any further.

Two other patients received one treatment each, but as one was practically totally blind and the other was not an unquestionable case of luetic optic atrophy, they may be left out of consideration in the present paper.

Comments.—We thus have here two cases, one caught reasonably early with arrest and even definite improvement of his previous condition. The other, caught late, at least shows arrest of his optic atrophy. Whether the first will show

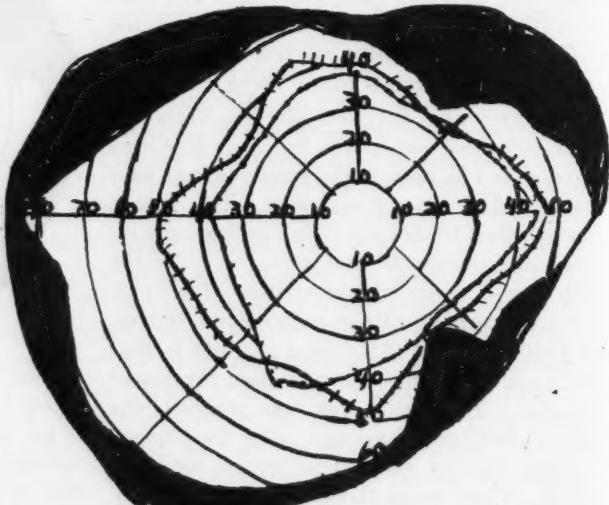


FIG. 3

further improvement or both will regress, time will tell and shall be reported later. In the meantime we are adding these cases as a small contribution to the work already done by Suker, Gifford, and Keegan and are relying on their conclusions without offering any of our own.

We might appropriately conclude this report with a comment of Graydon Hume³; "The serious and relentless nature of optic atrophy associated with the late stages of syphilitic infection, justifies one in attacking the disease by a route which has added risks."

REFERENCES

- (1) GIFFORD, SANFORD R., Intra-cisternal Injections in the Treatment of Luetic Optic Atrophy, *Brit. Jour. Ophth.*, 1923, vii, 506.
- (2) KEEGAN, J. JAY, The Technique and Reaction of Intracranial Mercuric Bichloride Injections, *Brit. Jour. Ophth.*, 1923, vii, 522.
- (3) HUME, GRAYDON, Optic Atrophy Due to Late Syphilis, *Lancet*, Nov., 1924.

CALCIUM AND POTASSIUM CHLORIDES IN THE TREATMENT OF ARTERIAL HYPERTENSION

W. L. T. ADDISON, B.A., M.D., AND H. G. CLARK, M.B.

Toronto

IN the issue of the *Journal of the Canadian Medical Association* for November, 1924, W. L. T. Addison reported the results obtained by calcium chloride therapy in fourteen cases of arterial hypertension. Since that time further clinical work has been done in the out-door department of the Toronto General Hospital.

After our cases had been thoroughly examined and given the usual dietary treatment by the out-door clinic for a month's time, they were turned over to the clinic for cases of arterial hypertension, and depending upon their weight, were given from ninety to 180 grains of calcium chloride per diem, in the following prescription:

<i>Calcii Chloridi</i>	$\frac{3}{2}$ ii
<i>Tinctura Cardamomi Comp.</i>	$\frac{3}{2}$ i
<i>Syrupi Simplicis ad</i>	$\frac{3}{2}$ viii
<i>Misce et Signa</i> —Two to four drachms in water three times daily after meals.	

Blood pressure readings were taken weekly. If at the end of a month's time no fall in pressure occurred, potassium chloride was substituted for calcium chloride in the same doses. When a fall in pressure occurred and was maintained, a clinical test was made to see if the salt were the active agent or not. All treatment was stopped for one or two weeks; any rise in pressure was noted and afterward the treatment was continued again. Many of our cases were so tested many times.

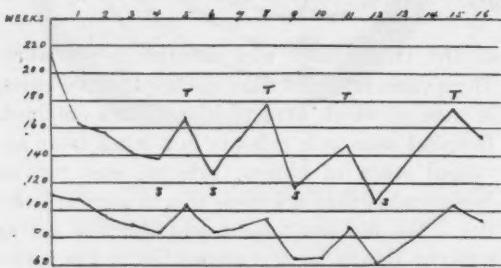
Results Obtained.—These reports deal with forty-five consecutive cases of hypertension, some from the clinic of the hospital and some from the private practices of the writers and

of Dr. H. B. Lane who assisted in the work. Three cases reported were in-door hospital cases, in none of which were positive results obtained. Hospital cases as a rule are in a much more advanced stage of kidney, arterial, and cardiac degeneration than are those seen in general practice. We did not expect and did not get as striking results in the former as in the latter for that reason. All cases had an initial systolic pressure of 170 mm. of mercury or over. Some ranged as high as 262. The diastolic pressures ranged from eighty-four to 152. The ages were from twenty-eight to ninety-one. Individuals in whom both kidneys were apparently normally functioning and cases in all stages of kidney destruction up to those diagnosed as end-stage interstitial nephritis were encountered. Only those cases were considered as reacting in whom the salt given reduced the systolic pressure thirty or more mm. and maintained it there, and kept the diastolic pressure twelve or more mm. lower than the initial reading. Of the forty-five cases twenty-six or 57.7 per cent. reacted with calcium chloride (Chart 1), and six or thirteen per cent. with potassium chloride, making in all 70 per cent. As explained above only those cases in which there was no result with the calcium salt were given potassium chloride (Chart 2). Not only was the blood pressure reduced but the patients felt decidedly better. As found by Blum and his co-workers, oedematous cases lost their oedema. The effect of the salt was considerably better during the summer than in the winter. Five patients whose pressure remained satisfactorily low during the warm weather of 1924,

promptly showed a rise in systolic and diastolic pressure with the advent of cold weather in November, and in one case with a fatal result. Conversely the warmer weather during April of this year has begun to produce marked improvement in these and other patients. The effect of cold is probably a protecting vaso-constriction, an action antagonistic to that of the salts on the blood pressure and, as seen, one more or less over-riding them.

The main objections to the giving of calcium chloride are the gastrointestinal upsets. The taste of the salt is very unpleasant, and difficult or impossible to disguise. Various gastric symptoms may be produced such as belching of gas, or

CHART 1, SHOWING EFFECT OF CaCl_2 ON HYPERTENSION



A case showing marked susceptibility to CaCl_2 after a month's treatment.

S.—Treatment discontinued.

T.—Treatment re-started.

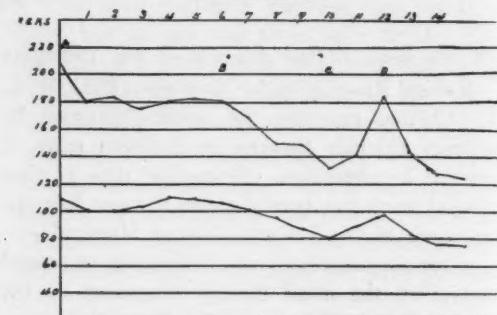
The very low figures could be obtained in twenty-four hours in warm weather.

in patients with sensitive stomachs even vomiting. To follow the dose with a glass of milk or buttermilk will considerably relieve this distress. In warm weather diuresis is promptly set up, but in so far as we know this does no harm to the kidneys. Bowlers and Walters discuss the examination of sections of dogs' kidneys after the animals had received repeated intravenous injections of calcium chloride. No evidence of damage was found. The calcium chloride produces, however, an inorganic acidosis, which, though not greatly dangerous, must be seriously considered. On no account should a patient take these salts without the guidance or direction of his physician. One passing observation may be detailed: a patient, age eighteen, with normal blood pressure and kidneys, was given 145 grains of calcium chloride per day for another condition, and he developed a distinct cyanosis on any dose over sixty grains. This, however, was the only case showing such symptoms.

Chemistry of Calcium Chloride.—The action

of calcium chloride is mainly attributable to the chlorine ion. Of eighteen cases in which the blood calcium was estimated, only one showed a reduction below the usual 10 mgm. per 100 cc. of blood. According to Haldane 90 per cent. of the calcium ingested is excreted in the faeces as calcium carbonate and calcium phosphate and the balance by the kidneys. The Cl⁻ ion is then free to substitute the CO₂ in the blood stream in accordance with the equation: $\text{Ca Cl}_2 + 2 \text{Na HCO}_3 = \text{Ca CO}_3 + 2 \text{Na Cl} + \text{CO}_2 + \text{H}_2\text{O}$. Haldane gives the urinary excretions roughly as follows in percentage of normal: ammonia 500 per cent., phos-

CHART 2, SHOWING THE EFFECT OF KCl ON HYPERTENSION



A typical chart showing no result with KCl, but a good result with CaCl₂.

A.—CaCl₂ started.

B.—KCl started.

C.—KCl discontinued.

D.—KCl restarted.

phate 200 per cent., chlorine 200 per cent., sodium 250 per cent. The alkali reserve is appreciably diminished and the blood calcium slightly raised. The action of ammonium chloride is essentially similar to that of calcium chloride. The ammonia is absorbed with the chlorine, but is destroyed by the liver and helps to form urea, thus freeing the chlorine which unites with the blood alkali: $2 \text{NH}_4 \text{Cl} + 2 \text{Na HCO}_3 = \text{CON}_2 \text{H}_4 + 2 \text{Na Cl} + 3 \text{H}_2\text{O} + \text{CO}_2$. Ammonium chloride has been tried in our cases but it is even more nauseating than calcium chloride.

The use of potassium chloride was suggested by the results obtained by Blum in the treatment of oedema. It produces a diuresis without the malaise and without the accompanying acidosis of the calcium salt. It will often promptly reduce a blood pressure when calcium chloride fails.

The heavy increase of ammonia excretion is worthy of special note in view of Dr. Major's work on the production of arterial hypertension by guanidine. This heavy excretion in the form of chlorides and phosphates leaves less ammonia to take part in the production of urea. When one considers the molecule of guanidine as a supersaturated ammonium salt of carbon dioxide, it is evident that in the buffering of an ammonia and carbonate mixture with carbon dioxide in excess, guanidine could hardly exist. It is probable that this buffering of carbon dioxide and ammonia is much more sensitive and rapid than has been supposed, and has been overlooked in the buffering of the blood salts.

Summary

1. Calcium and potassium chlorides will produce a decided fall in blood pressure in a large percentage of cases of hypertension with a

coincident improvement of the patient's symptoms.

2. Edema will improve and disappear under their action.

3. The treatment must be persisted in for three or four weeks to get results.

4. The only serious objection is the possibility of producing symptoms of an inorganic acidosis.

We wish to thank Dr. G. S. Young of the Toronto General Hospital for his assistance and advice in the work of this paper, and to state that the late Dr. Strathy had been a prime mover in the investigation.

BIBLIOGRAPHY

- (1) ADDISON, *Can. Med. Asso. Jour.*, 1924, xiv, 1059.
- (2) MAJOR, *Jour. Amer. Med. Asso.*, 1924, lxxxiii, 81-84.
- (3) MAJOR AND STEVENSON, *Johns Hopkins Hosp. Bull.*, 1924, xxxv, 180.
- (4) HALDANE, HILL AND LUCK, *Jour. Phys.*, 1923, lvii, 30.
- (5) BOWLER AND WALTERS, *Jour. Amer. Med. Asso.*, 1924, lxxxiii, 1232.
- (6) SALVESON, HASTINGS AND MCINTOSH, *Jour. Bio. Chem.*, 1924, ix, 327.
- (7) TISDALE, *Amer. Jour. Dis. of Child.*, 1921, xxii, 560.
- (8) HALDANE, *Lancet*, 1924, i, 537.

PERIPHERAL NERVE INJURIES*

FRED. H. MACKAY, M.D.

Montreal

PROBABLY no one epoch in recent medical history has seen more change in our conception of disease than that of the period of the World War. Many of the more radical changes of recent years may be attributed, directly or indirectly, to the influence of this period. While this is generally true throughout the whole field of medicine, it is especially so in our understanding of the subject now under discussion. Only upon such rich experience and vast opportunity as was presented during those years of war, could the possibilities underlying the scientific treatment of injuries of the peripheral nerves be even partially disclosed.

Meeting to-day, almost seven years after the final enactment of that period, enriched by long observation of these cases and enabled, we hope, to review our results with a more

matured judgment, we may ask ourselves the following pertinent questions:

First. Is treatment of injured peripheral nerves worth while, and have our original hopes in this field been attained?

Second. If so, what factors operate in certain cases to prevent or obscure this attainment?

My answer to the first question is that I have seen complete regeneration follow suture of almost every peripheral nerve to the extremities, ranging from such large and long nerves as the two popliteals to such a fine and short one as the circumflex. There can be no doubt as to the efficacy and completeness of peripheral nerve regeneration, and yet in the most promising of cases we may meet with disappointment, a fact which suggests to us the consideration of our second question. Part, at least, of the answer to this question will be attempted in the body of this paper. In so short a summary as this must necessarily be,

*Read at Eighth Annual Convention of the Association of Officers of the Medical Services of Canada, Ottawa, April 15, 1925.

I must confine our attention to the clinical aspects of the subject, neglecting for the present any consideration of the anatomy or histology pertinent to it.

The first problem to be encountered is that of a diagnosis, and from a practical viewpoint this resolves itself into one essential question: are we dealing with a complete lesion, one which will require operative interference, or an incomplete one in which spontaneous recovery may reasonably be expected? Let it be at once understood that the diagnosis of anatomical severance of the nerve trunk is practically impossible. Only when we can palpate distinct and widely separated end bulbs can this decision be arrived at, and even then with uncertainty. We must be content with a reasonable opinion as to the physiological interruption of function, and for all practical purposes this is a sufficient decision. Even a complete physiological interruption, observed shortly after injury, does not tell the whole story, for it too may show spontaneous regeneration later on, so that time is necessary for observation and frequent examination before a reasonable decision can be made. If after two to four months of treatment, directed towards the maintenance of the muscle nutrition, no signs of regeneration are noted, we may reasonably conclude that operative procedure will be necessary. What, then, are the indications of complete physiological interruption? Various workers in this field have formulated a number of syndromes under which lesions of varying intensity may be classified, but on the whole, I consider they are misleading and unnecessary refinements to which any close adherence must lead to confusion. We have, for instance, the syndrome of interruption, the syndrome of compression, the syndrome of irritation, the syndrome of dissociation, and finally, the syndrome of regeneration, all of which are but processes in nerve pathology and all of which may accompany any one lesion. Practically, if at the end of an allotted time, whether six weeks or three months after the injury, one notes complete paralysis of all muscles supplied by the nerve, complete and progressive reaction of degeneration, distinct though varying sensory disorders, and progressive atrophy of the paralyzed muscles, one is justified in the conclusion that one is dealing

with a complete lesion, and the sooner the nerve is uncovered, the better for the patient.

The diagnosis of the particular nerve trunk involved is but a matter of anatomical knowledge and need not detain us here, but the estimation of the degree of injury—the final decision between complete and incomplete lesion—is always difficult and frequently possible only after long observation, supplemented by periodical examination. Let us recall some of the difficulties and fallacies encountered in these examinations.

Motor signs.—Complete or partial paralysis of the muscles supplied by any one nerve trunk would appear at first sight to be definite evidence of the severity of the lesion, but in estimating motor loss one must guard against certain supplementary movements which might otherwise be accepted as evidence of voluntary movement. It is surprising how frequently movement may be initiated in a joint segment by forces other than those of its associated muscle, and thus convey to the observer the opinion that there is voluntary motor power in this muscle. This is commonly seen in the extensor groups of both extremities. Given a complete lesion of the musculo-spiral nerve, one may still perceive weak extensor movement at the metacarpo-phalangeal joint. In this case, the voluntary efforts directed towards extension of the first phalanx overflows to the antagonistic flexor group, causing mild flexion, the rebound from which simulates an extensor movement. This is true of all synergically acting muscles, and must be guarded against.

When voluntary movement is attempted by a paralyzed group of muscles the antagonistic groups are over-contracted and the rebound from this over-tension simulates movement of the segments in the direction of the paralyzed muscles.

Again, certain attitudes of the limb may be responsible for fallacious opinions. Slight extension of the proximal phalanges of the fingers may be apparent if the hand is allowed to be flexed at the wrist. This results in undue tension on the lifeless extensor tendons and is registered in extensor movement of the phalangeal segments. This fallacy is obviated by maintaining the hand and forearm in alignment. Likewise, extension at the wrist joint may be apparent if the fingers are strongly

flexed, thereby setting up tension on the extensor tendons of the fingers and simply dragging the hand into the position of extension.

It has been said that abduction and adduction of the hand is abolished in the presence of musculo-spiral paralysis, and yet I have frequently observed lateral movements of the hand in these cases accompanied, of course, by some degree of flexion, and attributable, no doubt, to the action of the flexor carpi radialis and ulnaris.

Because of the frequency with which the ulnar and median nerves overlap and supplement each other in both motor and functional distribution we will consider them together. Anatomically the ulnar may be regarded as an inner branch of the median.

The digital distribution of these nerves is far from constant and quite frequently the thumb and index fingers are the only digits paralyzed in the presence of a complete median lesion. This of course implies supplementary innervation of the middle and ring finger tendons by the ulnar. I know of no evidence to disprove the innervation of the interossei by the ulnar alone, and as the function of these muscles is to abduct and adduct the fingers, to extend the two distal phalanges, and in conjunction with the lumbricals, to flex the proximal phalanges, one would expect to find all these functions lost in complete ulnar lesions. And yet, extension may be observed in the terminal phalanges, brought about probably by contraction of the extensor communis digitorum which drags on the distal segments through the lifeless bellies of the dorsal interossei which now serve as fibrous connecting structures only.

These are some of the supplementary movements—and there are many others—that so frequently complicate the clinical picture, and give rise to the erroneous belief that motor power is present, when all the while we are dealing with a complete lesion of the nerve. The conclusion is obvious, that simple movement of the joint segment does not necessarily indicate integrity of the nerve of supply.

Sensation.—To what extent may we depend upon sensory disturbance as a guide to the severity of the lesion?

The variability of sensory loss in proven cases of complete nerve lesion is so great that one learns early to dispel his older ideas of

peripheral distribution. Anatomically, of course, the geographical distribution allotted to the various nerves is correct, but so great is the overlapping of adjacent terminals and so frequently do we meet with irregular anastomoses between adjacent nerve trunks, that the actual field of clinical loss seldom, if ever, coincides with the anatomical.

Complete ulnar lesions may be accompanied by loss over the entire anatomical area, or, this loss may be limited to the little finger alone, more frequently extending just below the base of this digit. Likewise, totally interrupted median lesions may show sensory change over the whole of the median area, or simply to the index finger alone. I have seen sensory loss limited to this one finger with a mild degree of hypalgesia over the palmar surface of the thumb in the case of a complete median lesion.

Complete division of the musculo-spiral nerve above the origin of the radial branch is frequently unaccompanied by cutaneous loss.

Here a word of explanation is necessary. In recent years, the accepted theory of cutaneous sensibility as enunciated and established by Head and his co-workers, has been subjected to much adverse criticism. Head established the theory that cutaneous sensibility was subserved by two separate and distinct peripheral nerve systems—distinct anatomically and phylogenetically,—one the protopathic, underlying sensation of the coarser variety, viz., crude pain and the extreme degrees of temperature; another, the epieritic, underlying finer sense perception such as light touch, compass point discernment and the finer degrees of heat and cold.

Following division of a nerve trunk, he was able to outline two superimposed areas, one much wider and complying with the accepted bounds of anatomical distribution, which was the cutaneous expression of the epieritic system. The other was of more limited distribution and represented the area of supply of the cruder protopathic system. This system, he held, regenerated more quickly than the delicate, more highly differentiated epieritic system.

Recently and particularly during the period of the war, much attention was directed toward the establishment or renunciation of this theory and I believe I am right in making the state-

ment that the great mass of this attention tended to disprove it.

If one attempts to outline these two zones of sensory loss, in the light of Head's theory, his first objective must be that of the epieritic sense, better referred to as light tactile sense, inasmuch as its area is the larger and conforms more to the geographical field of the anatomist.

Then by means of ordinary pin-prick, he is able to outline a smaller area, centrally or proximally superimposed upon the former. With more moderate prick, the area may be considerably enlarged and finally with light prick, so designed as not to activate the underlying muscle sense, it may be extended, peripherally, until it coincides with the whole field of disturbed sensation. Thus, by the use of very light prick, the so-called protopathic area is identified with the epieritic.

I have paid more than ordinary attention to this phase of sensation and at no time have I been able to satisfy myself that such differentiation exists, having invariably found that the area as outlined with light pin-prick is identical with that of touch to cotton wool. My own feeling is that these varying fields of sensory disturbance are purely quantitative and that the terms "protopathic" and "epieritic," while useful to express extreme degrees of response to a similar stimulus, are not necessarily—in fact not likely to be—descriptive of two distinct cutaneous nerve systems. Any hypothesis, for instance, that attributes to one type of sensation, namely, temperature sense, the necessity of two distinct nerve systems, would appear to be a physiological superfluity, and this is not often indulged in by nature. Thus one comes to rely upon light pin-prick as the essential and sufficient test for cutaneous disturbance—a disturbance by no means invariable but, rather, strikingly inconsistent in its clinical distribution.

Electrical Reactions.—All information under this heading may be obtained simply from the use of faradic and galvanic stimulation. Even in the less severe lesions there is early loss of faradic response while in complete lesions there is absence of faradic excitability throughout the entire period of regeneration. As a diagnostic measure faradic response is invaluable, as its absence indicates physiological interruption of the nerve. Its prognostic value, how-

ever, is greatly depreciated by the fact that it remains absent throughout regeneration, being commonly, the last factor to return. In the differentiation of hysterical paralysis, it is of course of paramount importance.

Galvanic excitability being a function of the muscle itself is present throughout the whole course of treatment but in an altered form. With the onset of degeneration the quick flash-like response of normal muscle is replaced by a slow sluggish contraction with retarded relaxation.

These two altered phenomena, the absence of faradic excitability and the altered galvanic response constitute our most valuable index of the reaction of degeneration.

Polar inversion as applied to the galvanic current is a phenomenon too difficult of interpretation to be of practical application. The practical use of the condenser, an apparatus by which the actual amount of electrical stimulus may be measured, has found favour with many workers interested in the phenomena of regeneration, but my personal experience with this machine has been, on the whole, disappointing. Frequently, I have noted gradual improvement in the condition of the muscle as reflected in the number of microfarads necessary to give a response advancing from 2.0 mfd. at first examination to 0.5 or even 0.33 mfd. in the course of a month or six weeks, only to find at operation that we were dealing with a complete lesion, presenting well formed bulbs at either end. Repeated similar disclosures have shown us that improvement in the muscle belly does not necessarily mean regeneration of the nerve.

So far as I am aware, no form of mechanical device has yet replaced the simple observation that loss of faradic response, coupled with the altered galvanic response, is the best clinical criterion of the reaction of degeneration.

Atrophy and trophic disturbance.—Any attempt to measure the severity of a lesion by either the rapidity or extent of development of muscular atrophy must lead to erroneous conclusions. In fact, atrophy which is always more apparent in the smaller muscles is generally more pronounced in lesions of lesser severity. Particularly is this true of those changes in the skin and nails referred to as trophic disorders. The most extreme trophic disturbances follow partial lesions, especially those of the irritative

type. By the irritative type is meant a mild irritation of the nerve trunk which at operation shows neither serious compression nor complete dissolution. Generally the nerve trunk is a bit reddened, frequently swollen and edematous. Occasionally, no visible change can be made out.

The term causalgia, first given to the condition associated with this type of lesion by Weir Mitchell, during the American Civil War, embodies one of the most painful and distressing conditions in medicine. The intense burning pain, accompanied by paroxysms and unrelieved by any known palliative measure; the characteristic attitude in which the hand is held; the peculiarly dried out atrophic appearance of the skin; the evident fear with which the affected member is guarded against the slightest stimulus, and finally, the mental apprehension which characterizes these sufferers completes a picture which I need scarcely recall to this audience. The condition is found only in lesions of the median and internal popliteal nerves, the terminal filaments of which are rich in sensory corpuscles. These corpuscles are anatomically and physiologically connected up with the sympathetic system which for the greater part is distributed along the course of the arterial system.

Lariche attempted to relieve this condition by stripping the main artery of supply of its sympathetic fibres but, though successful in some cases, the operation failed to relieve many of them, a logical result in view of the knowledge that a great proportion of these fibres is distributed within the main nerve trunk and so is directly involved in these so-called irritative lesions.

If we have followed the course of these lesions we must be surprised and alarmed at the length of time necessary to evolve a cure; in fact, many are still troublesome and the end is by no means in sight. How far mental suggestion may play its part in the perpetuation of this discomfort is not possible to estimate but, no doubt, it is a considerable factor in the prolongation and fixation of the symptoms. Alcohol injections as introduced by Sicard, have given temporary relief from pain but, as measures of permanent cure, have been unsatisfactory.

Because of the prolonged suffering which

ultimately engenders psychic fixation it would appear logical to section these nerves at the outset, resect the thickened edematous portion and suture, end to end. This of course converts the lesion into a complete one, with complete loss of function but in view of the prolonged course and keeping in mind the prevention of the inevitable psychic element, this would appear to be the logical procedure. Delaganiere who has carried out this method, reports good results in all his cases.

Probably no phase of the whole subject presents a more fascinating field for speculation than that of nerve regeneration.

The gradual but steady peripheral growth of the fibrils, circumventing what would appear to be insurmountable obstruction and finally linking up with their respective end-organs to complete the physiologically effective neuromuscular unit, constitutes one of the most interesting repair processes in the whole field of pathology. The most valuable early sign that repair is taking place is that described by Tinel and known as the Tinel sign. It is of practical use only in mixed nerves for its value depends upon the presence of sensory fibres. Tinel observed that gentle percussion of a mixed nerve at the point of injury set up a sensation of tingling at the distal distribution of the sensory fibrils and made use of his observation in tracing the growth of these fibrils, peripherally. In regenerating fibres that are preceding distally, their growth is marked by the gradual progression of this zone of formication toward the terminal distribution of the nerve.

If in two months after injury the sign cannot be elicited, it is very improbable that regeneration is going on.

It is a matter of common observation that regeneration is more rapid and complete in predominantly motor nerves such as the musculo-spiral and external popliteal. Moreover, in mixed nerves the return of motor power, so often in advance of cutaneous sensation, suggests that repair is more rapid in motor fibres than in the sensory ones. We may infer therefore that with the evidence of sensory repair as expressed in a positive Tinel sign, motor repair is proceeding, *pari passu*.

The question of precedence in the return of motor or sensory function is one of varying

opinion, many of the French writers being in accord that sensory function is manifested frequently before motor. My own experience is that return of motor power is not only the earliest but, also, the most essential manifestation of complete regeneration. The return of myotatic reaction—localized contraction of the fibres on sharp percussion—is followed by a sensation of increased tone and fullness in the muscle belly. Suddenly, then, a voluntary contraction just happens but no amount of voluntary effort on the part of the patient can bring about an immediate repetition.

From this stage to full motor return, re-education, supplemented by galvanic stimulation is the keynote of accomplishment. Some of the finer expressions of electrical activity, such as the disappearance of the longitudinal reaction and a sharpening of galvanic response may make their appearance before voluntary activity is noted, but faradic response is, as a rule, so late in its appearance as to be of no prognostic value.

Regeneration is an orderly physiological process which demands both time and attention. Under ideal conditions it progresses at the rate of from 2 to 4 cmm. per month so that the distance to be traversed is a factor of fundamental importance in our time estimate. Probably all of us have at one time or another heard of cases which after suture have shown immediate restoration of function—a phenomenon which if accepted would seriously disturb our conception of the physiology of regeneration. It has not been my fortune to have observed such a case and with all due respect to the recorders of these isolated incidents, I cannot but reserve the final opinion that somewhere, somehow, someone has slipped.

And now we come to the consideration of our second question:—If regeneration occurs in so orderly a fashion, why do we meet with so many disappointments, and what factors are concerned in the retardation or obstruction of this apparently natural process? The first factor which I shall mention is embodied in a disregard of the muscle component of the neuromuscular unit. Particularly in smaller muscles the degenerative processes incident upon injury of its nerve of supply are very rapid and complete so that the final step in regeneration—

the linking up of fibrils with end-plates—finds a muscle incapable of contractile power.

If a muscle has lost its myotatic irritability, that is, its ability to respond by local swelling or contraction to a sharp blow, it is very unlikely that it can ever resume its normal contractility. General nutritional care of the parietic muscle as embodied in the principles of massage and electrical stimulation, is imperative throughout the whole course of repair. Of almost equal importance is postural care. The limb must be maintained in such position as will obviate dragging or tension on the paralyzed muscle. The overaction of the healthy antagonist group must be guarded against while at the same time every precaution against improper or prolonged splinting is exercised.

One of the most disquieting conditions met with to-day is a fully regenerated nerve, one in which nature has played her full part, even to the return of complete electric excitability, and yet, the hand is a total loss. Prolonged immobilization, coupled with insufficient nutritional care has converted this member into a mass of fibrous fixations which no amount of manipulative treatment can overcome. Foreseeable breaking down of these adhesions under anaesthesia only accentuates the disability and, because of the extrusion of serum and blood, serves only to reinforce the fibrosis. In the milder cases some improvement may be brought about by manipulative exercises but, even here, the effect is limited though occasionally one meets with a result that justifies the attempt.

We have already referred to the more effectual regenerative qualities of motor nerves such as the musculo-spiral and external popliteal. One factor in this apparent superiority is that we are dealing entirely with fibres of like function. All being of the motor variety they may be distributed along the course of any bundle in which they happen to be caught and still maintain their functional activity. They must ultimately find their way into muscle tissue. Not so, however, with mixed nerves such as the median, ulnar or internal popliteal. Here, sensory fibres may be directed along motor channels while, conversely, motor fibres may follow sensory pathways to the skin.

In either case, there is a permanent functional loss of these fibres with consequent diminution of their respective activities. This

factor is impossible to foresee and difficult to prevent. Even in the best operative technique where torsion of the opposing ends is reduced to a minimum, this shunting of fibrils is bound to occur. The result is lessened function in one or both fields of distribution. Even in pure motor nerves, this re-arrangement of fibrils may result in unequal distribution, one muscle receiving more than its share, another less, so that functional activity may be unequally distributed among muscles of the same grouping. The incoordination that naturally follows is best remedied by re-educational exercises, the details of which may be worked out by the patient under the guidance of a physiotherapist.

And lastly, we may just mention the psychological factor. In a very small percentage of cases where all evidence points to complete regeneration of the neuro-muscular unit, one may meet with persistent paralysis.

The cause is psychological—the remedy, psychotherapy.

Summary

The diagnosis of nerve injuries resolves itself

into one of partial lesion, which is followed by spontaneous regeneration or complete physiological lesion, necessitating operative interference. This differentiation is attended by many difficulties, chief among which are the fallacies of supplementary motor movements; the irregularities in cutaneous sensory distribution, and the inconsistencies of too refined electrical reactions.

If at the end of three months, during which time nutritional care of the muscle has been maintained, repeated neurological examinations fail to reveal the signs of regeneration, operation is indicated. Further observation is not only a waste of time but a detriment to the best chance for the patient.

The logical treatment of causalgic lesions is resection and suture.

Certain factors tend to impede or obstruct the process of regeneration, chief among which are improper care of the affected muscle and diversion of nerve fibrils into incompatible end organs, the latter accounting for the prolonged and often incomplete restoration of function seen in mixed nerves.

The Future of Man.—Sir Arthur Keith, whose Hunterian lectures at the Royal College of Surgeons on "Recent Discoveries of Fossil Man" have attracted much attention, gave a special interview to the *Westminster Gazette* in which he dealt with the fascinating subject of the future of man. "Those who will inherit the earth," he said, "will not be people predominantly intellectual, but people of robust constitution with a good deal of what is called the animal in them." The brain of primitive man was bigger than that of man today, but the part of the brain that carries out intellectual operations is only a small part of the whole brain. A preponderance of intellect, he considers, reduces its possessor's happiness, making him too keenly conscious of man's frailty and weakness. He scouted the vision conjured up by novelists and others of the advent one day of a superman who would be all intellect. "Whatever may happen in the future," he said, "I think we may

take it as certain that man will never develop into a huge-brained fellow, living only on pellets of energy and preoccupied only with abstruse mathematical and other problems." The extent to which people are intellectual is shown by the modern newspaper which deliberately sets itself the task of suiting popular taste. A Sunday paper with a big circulation gives an idea of the proportion of man's interest in intellectual matters as compared with "human" matters. Even the most intellectual paper does not give more than 5 per cent. of its space to intellectual matters. Sport, crime, sex, gambling and politics fill the bulk of its columns. Even cross-word puzzles Sir Arthur Keith regards as an ebullition of animal nature.

During the recent German elections six medical practitioners, including one woman, Dr. Moses of Berlin, were elected to the Reichstag.

BILIARY DISEASE AS SEEN IN GENERAL PRACTICE*

F. N. G. STARR, C.B.E., M.B. (Tor.), F.A.C.S., F.R.G.S.

Professor of Clinical Surgery, University of Toronto

I DO not know when I have been compelled to give so much thought to a subject as now in order to make my experience of nearly one thousand operative cases of gall-bladder disease of interest to the general practitioner.

In order to clear the air one must get rid of such terms as indigestion, acute or chronic, dyspepsia, torpid liver, and what not, for, while they may mean a lot to the patient, they convey no information to the doctor except in so far as he has studied the advertisements of the "cure-alls" put out by the manufacturing chemists. Never ask a patient what he complains of, for he will be sure to come back with "Why, doctor, that's what I came to have you find out!" This was so common in my young days that I kept track until it ran up into several thousand; then I developed a new form of preliminary question: "How does your trouble affect you?" and this at once puts a thinking cap upon his head and one may get somewhere. On one occasion only when I asked this question of a farmer, who wore his cow-hide coat, cap, and a muffler into my office so that only a chink permitted one to see his eyes, did I get a rebuff. He replied "I ain't goin' to tell you a derned thing." I said "You have come to the wrong man. You should see a specialist," and I gave him the name and address of a well known veterinary surgeon. In about an hour he was back to say, "That feller's a horse doctor," and when I told him I thought he was an ass and needed a horse doctor, it took the best part of another hour to check his talk!

When a patient comes complaining of indigestion, or dyspepsia, or a torpid liver, he of course has been reading quack literature, and it is very necessary to find out by analyzing the statement what he means. In other words we must find out if his indigestion is pain, or merely discomfort, or gas. When we discover what he means, then we can find out what rela-

tion it bears to food. Is it worse immediately after meals, or later? or is it worse only after certain kinds of food such as fat, fried food, etc., or perhaps it is a nausea that comes on at the sight of food or at the sight of certain kinds of food, while many fear the consequence of taking food.

Many gall-bladder cases have constipation, but if you ask about the bowels people will say they are regular, but if you go more fully into the case you will find they are regular because they are in the habit of taking a daily laxative. Few cases have diarrhoea, and when it is present it is preceded by discomfort in the right upper abdomen.

People with biliary disease seldom volunteer the information, but if you ask them they confess to a chilly feeling upon going to bed, and it takes them a long time to get their feet warm. Many complain that they can't take a decent breath because of the sense of fullness in the right upper abdomen. Mucous colitis *per se* is a comparatively rare disease, but mucus in the stools is a common symptom in gall-bladder disease. In other words get an accurate history from the patient, analyzing his every statement before you begin a physical examination.

Jaundice (catarrhal).—Let us now come to the question of jaundice. Was the patient quite well the previous day but felt unreasonably tired at night, and yet was restless, and when he awakens he finds a greenish-yellow tinge to the skin, and upon enquiry one finds plenty of bile in the stools. This is probably a catarrhal jaundice and needs only medicinal measures including rest in bed.

(Familial).—It may be suddenly apparent to the family that some member who feels all right is of a greenish-yellow tint and he will consult the doctor. If one is on his toes and will but take the trouble to make a careful examination, he will find an enlarged spleen, and if he enquires further he may find this has occurred before and that it has occurred in

*Delivered at the Annual Meeting of the Ontario Medical Association, May, 1925.

other members of the family connection. Advice as to the removal of the spleen with proper precautions, rather than a direct attack upon the gall-bladder, will redound greatly to the doctor's credit.

(Infective).—If the patient is ill with some infection and suddenly or gradually develops jaundice, the trouble is infective jaundice and must be treated as part of the general infection.

Then there is the jaundice following an infection in the form of an acute pylo-phlebitis, when one is always safe in giving an unfavourable prognosis. Of course a slight jaundice may occur in the case of almost any of the acute infections such as pneumonia or typhoid, and clear up again quickly. Then there is the jaundice of acute yellow atrophy of the liver which unfortunately is rare, but may follow phosphorus poisoning or a low grade infection.

Failing to find any of these as a causative factor, then one may be allowed to think of gall-stones or of malignant disease, but not until the other possibilities have been well canvassed and disposed of. If it comes on suddenly following an acute attack of pain in the right upper abdomen, and if the stools upon examination are like putty or blue clay, it means there is an obstruction in the common duct. If on the other hand the jaundice comes on gradually without pain, in one whose health has been failing or who has been losing weight for some time, it is more likely to be due to malignant disease, most commonly of the head of the pancreas.

Before I leave the subject of jaundice, I must warn you that sometimes the cæcum has not fully descended and an appendicitis occurs with abscess formation and of course marked tenderness under the right costal border, giving rise to sufficient associated inflammation in the duet to obstruct and cause jaundice. I have twice been called out of town to operate upon an acute gall-bladder under such conditions and have been able from the history to at least make a fairly good guess as to the condition, and have evacuated an appendiceal abscess in the upper abdomen.

Several times I have been called to operate upon an acute cholecystitis and have found the trouble to be a strangulated hernia, both inguinal and femoral. People do not readily forgive the doctor such mistakes and the sur-

geon requires to be a diplomat as well as a surgeon to clear up the situation.

Having more or less "cleared the decks," one comes to the more immediate subject under discussion. The evolution of a cholecystitis, be it acute or chronic, often becomes a calamity in a man's life. He usually comes to the doctor in the chronic cases and complains of "indigestion," or in the acute cholecystitis or gall-stone colic the doctor is sent for, and in the former he finds the man lying very still, manifestly suffering but afraid to move, with frequent vomiting which increases his distress; or in the colic he may find his patient rolling about on the bed, on the couch, or the floor, or sitting holding on to a table with his belly tight against it, but if he vomits he gets relief. Some of the family will tell you that father, or mother as the case may be, has acute indigestion, or gastritis, or what not, but make your own diagnosis and do be frank about it when you think you have differentiated from other abdominal pain such as renal colic, pyloric spasm, perforated ulcer, or the girdle pain of ataxia, for sooner or later the patient becomes a burden to himself and his family, with recurring attacks. He too becomes an annoyance to the doctor, who begins to suspect him of getting too fond of the morphia, and in the chronic cases the doctor begins to take refuge in neurasthenia. Sometimes I doubt if there really is such a thing that has not a pathological basis. If you do not "hump" yourself the first thing you know your patient is off to see another doctor who may suggest the proper course of treatment, and the next thing you know your respective wives are not on speaking terms!

Gall-stones are about three times more common in women than in men, and still more common in women who have borne children. This has been explained by the fact that the bile of pregnant women contains four times more cholesterol than that of other women or of men, and to this add the further risks of infection during the puerperal period.

If a patient has pain in the upper abdomen there must be some pathology at the back of it, and it is our job to discover what that pathology is. In going back into the history one is often struck by the prolonged disturbance. In 13 per cent. there were attacks of pain, head-

ache, and bilious attacks before the age of ten; more than 10 per cent. between the ages of eleven to sixteen; 14 per cent. between seventeen and twenty-five. In other words one gets a history of pain, headache, and bilious attacks in over 36 per cent. of the cases before the age of twenty-five years. If this means anything it means that an innocent stomach has been convicted of all sorts of crimes upon very flimsy evidence, and has been punished with all kinds of nauseous messes. An analogy would be the conviction of one of us for speeding when we are sitting in the car in the garage testing out the spark plugs!

Some patients complain of pain and refer it to the right costal margin, others to the epigastrium, and associated there with pain also in the lower dorsal region. In 9 per cent. there was a distaste for food. In 18.1 per cent. there was a fear of eating, because of the consequences. In 24 per cent. the appetite was good. We have observed in many of these cases that the eighth, ninth, and tenth dorsal roots on the right side are tender to pressure, and if the condition is acute, there is a definite hyperesthesia not only just below the right costal margin, but also over this area. Very often the patient volunteers the information that he hesitates to take a long breath because of the distress that it creates. Sixteen per cent. complain of constant distress within one-half to one hour after eating. In 3.8 per cent. only did this distress depend upon the size of the meal, and the same applies as to the time of taking it, but in 22.7 per cent. the distress depended upon the kind of food taken, especially fats, or fried food, and in a few of these, vegetables. In 32.4 per cent. the chief cause of complaint was gas on the stomach, sometimes beginning while eating, often preceded by nausea, frequently in from fifteen minutes to one hour after. Often a patient with chronic gall-bladder inflammation sits down to the table with a good appetite, but the sight of food causes nausea.

From this study, from previous analyses of cases, and from animal experiments, one is convinced that inflammation of the gall-bladder begins in early life. From observation at operation, I have become convinced that in some cases stones develop; in others there develops local or generalized liver cirrhosis, and in about

6.2 per cent. of others chronic pancreatitis. When stones develop and the gall-bladder containing them is removed—providing they are not also present in the hepatic and common ducts—the result is as a rule satisfactory. If there are stones in the hepatic or common duct, these must also be removed and the common duct drained. Even then stones may recur. When liver cirrhosis has developed, one must be more or less guarded in the prognosis, as it is doubtful if this fibrosis can ever completely clear up, even when the cause has been removed. Hence such patients are prone to suffer from some digestive disturbance.

Now with reference to pancreatitis. Archibald has shown that the ampulla has a sphincter. We know an acute pancreatitis may occur as a result of an impacted stone in the ampulla of Vater, but what is the explanation of a low grade pancreatitis in these chronic cholecystitis cases? Of course there must be some reason why the bile, in the absence of stone in the ampulla, finds its way into the pancreatic ducts. *I know that spasm of the neck of the gall-bladder does occur*, for once I had my finger caught and held so tightly that to have withdrawn it would have meant tearing out the gall-bladder and its duct. It was necessary to wait until the patient was deeply anaesthetized before I could release my finger. Is it not conceivable that *a spasm may occur simultaneously at the neck of the gall-bladder and at the ampulla*, when the bile, with great force, would be driven up the pancreatic ducts?

If one has once seen acute haemorrhagic pancreatitis, he will not readily mistake it on a future occasion. The vomiting, the acute suffering from violent epigastric pain, the cyanotic pallor, the appearance of shock, often unrelieved except by an anaesthetic, can rarely be confused with any other acute abdominal condition. From this violent type of pancreatitis there must of course be all sorts of gradations, just as in any other type of inflammation, and these become more and more difficult to interpret as they lessen in severity.

The pain is epigastric and a little to the left of the mid-line; the patient can frequently put his finger upon the point of maximum pain. The tender point is over some part of the pancreas, and of course associated with it is the

cholecystitis. One must guard against mistaking acute perforation of a viscus for an acutely inflamed pancreas.

If there have been repeated attacks and the pancreas is in a state of chronic inflammation, there frequently develops a pigmentation of the skin known as "haemochromatosis." There is also a loss of appetite, often nausea at the sight of food, with gastric discomfort coming on an hour or so after meals.

In addition to that and a history of frequent gall-stone attacks one has to depend largely upon functional diagnosis; for example, when the internal and external secretions are involved, there will be only a partial use of protein and fat, hence the carbohydrates absorbed go out as glucose in the urine. If the external secretion alone is affected, muscle fibre and fat appear in the stools, because the digestion of protein and fat is interfered with.

Having covered some of the ground of the large order handed out by your committee, I am not going to weary you with operative details, but I may be able to interest you with an analysis of some of our results so far as relief of symptoms occur.

Results.—The large majority complained of gas on the stomach; of these 79.11 per cent. were relieved by the removal of the gall-bladder. In our series 39.4 per cent. complained of constipation, and of these 70.2 per cent. were relieved of this condition by surgical interference. Diarrhoea is present in very few cases and when it does occur it is preceded by a sense of discomfort in the right upper abdomen. Mucus in the stools was present as a symptom in 26 per cent. of the operated cases, and of these 90.3 per cent. were entirely relieved of

their "mucous colitis" for which they had sought treatment on many occasions. It is interesting to note that in a large series of these cases presenting this troublesome symptom, we found upon culture the *Staphylococcus aureus* in the gall-bladder. Nausea which was present in so many of these cases has been stopped entirely in 86.7 per cent. and of those that complained formerly of attacks of vomiting—and more than 43 per cent. presented this complaint—96.2 per cent. were entirely relieved.

Mortality.—One of the most difficult problems to get at is the mortality rate, therefore I have left it till the end, hoping my time would be up. In the uncomplicated case of chronic cholecystitis, when a cholecystectomy is done, this is well under one per cent. while in the desperately acute imperative emergencies where only the simplest drainage is done the mortality is approximately 15 per cent.; and in the variously complicated cases with acute or chronic pancreatitis the rate is almost 5 per cent.

Ultimate Results.—Of our patients who live—and you see the vast majority do—60 per cent. report themselves cured at the end of a year. An additional 31 per cent. are relieved of most of their symptoms, reporting themselves as free of most of their symptoms, and about one-half of one per cent. claim to be worse.

With improvement in diagnosis and a more sane direction of treatment, this mortality may be greatly improved by an earlier resort to surgery, so that these desperate emergencies may be avoided and brought into the less than one per cent. class.

Decline in the Medicinal Use of Alcohol.—In Edinburgh, forty years ago, every patient cost on an average \$10.75 a year for drink, as part of treatment; last year, every patient cost about 10 cents. This illustration of the reduction in the use of alcohol in the treatment of disease was given at a National Commercial Temperance League luncheon in London. In 1900,

every patient admitted into the great London hospitals received on an average nineteen tablespoonfuls of brandy as part of the treatment. Last year, every patient received on an average about three tablespoonfuls. All over the world there had been a great decline in the use of alcohol in treatment of disease.

BLADDER NEOPLASMS, WITH A BRIEF SERIES

DAVID W. MACKENZIE, M.D.

Department of Urology, Royal Victoria Hospital, Montreal, Que.

IN considering malignant growths of the bladder we find a great diversity of opinion both as to the pathology and methods of treatment. There are many classifications of these growths, and many ways of dealing with the subject. Some authors depend entirely on the microscopic findings while others are guided mainly by the clinical picture. The great difficulty in the diagnosis by microscope is the transitional type of cell, and the manner of growth. How often in every service do we find the laboratory report "papilloma undergoing malignant change." Oertel contends it is almost impossible to distinguish between a diffusely growing carcinoma and a sarcoma in the bladder. But the difficulties are not confined to the microscope. The clinical diagnosis has also its problems.

In 1922 Lower reviewed so thoroughly the classifications of Buerger, Geraghty, Judd and Harrington, Barringer, and the end results of Gardner, Thomas, Scholl, etc., and also added so excellent a series of 222 cases of his own that it is unnecessary for me to go into details of previous experience and conclusions.

The majority of primary tumours of the bladder are of course the papillary fibroadenomata, and the papillary villous cancers. Besides these, squamous celled cancers with epidermisation, the cylindrical cell cancers, are at times noted. Of other tumours, fibromyomata, sometimes with other connective tissue additions, and large, sometimes papillary, nodular, sarcomatous myomata of either smooth or striated muscles occur. Much rarer are the ordinary small, round-celled, sarcomata, spindle-cell sarcomata, and, very rarely, lymphosarcomata and osteosarcomata.

In the histogenetic classification of the tumours according to the type of their parent soil, a distinction is made in the first place between epithelial and non-epithelial tumours. The latter are naturally derived from the deeper layers of the vesical wall, the muscular or the submucosa. Among the benign mature forms, myomas, leiomyomas, and fibromyomas are met with, and pure fibromas may also occur. These

tumours are usually small, spherical and easily enucleated. They acquire a greater interest when the shape of their cells, and, often at the same time also, the type of their growth, undergo a change. In this manner, large, nodular, fibrosarcomas and myosarcomas, consisting of immature anaplastic cells, may originate. Pure sarcomas are rare.

The tendency of the bladder to the formation of mixed tumours is shown by such malignant tumours being often mixed with various other tissue types; genuine teratomatous mixed tumours have also been observed. There are osteoid chondrosarcomas, rhabdomyosarcomas sometimes with cartilaginous insertions, adenofibrosarcomas, and so forth. Furthermore, there are angiomas, carcinomas, and lymphangie endotheliomas.

The most important groups of bladder tumours are the epithelial tumours. These are derived in part from the epithelial nests or from aberrant prostatic germs, adenofibromas and adenomas, or they are developed from the surface epithelium. These tumours are the proliferations generally known under the name of papillomas, and papillary carcinomas. In the interest of accurate nomenclature, these tumours should be designated not as papillomas but as papillary epitheliomas or fibro-epitheliomas, and as papillary carcinomas, for any tumour can be papillary, including sarcoma, whereas the decisive point for the designation is the histological composition of the tumours, and this is fibroepithelial in character.

Probably a larger number of bladder cancers than supposed are extensions from the prostate. Kaufmann states that out of twenty-seven prostatic cancers, eighteen had extended to the bladder, and with preference for the posterior wall. This has recently been brought quite forcibly to our attention in three operative cases, and in two not operated upon. The growths in the bladder are commonly knob-shaped, nodes and plates, covered with relatively normal mucosa or with slight sloughing. They often re-

semble clinically a strawberry myoma, and have slightly the appearance of the aged canned strawberry. Some surgeons believe that many so-called primary bladder tumours are in reality prostatic cancers. The fact that a prostatic cancer may occur in a grossly not enlarged prostate makes this not improbable, even in cases where the prostate is apparently grossly unchanged.

The epithelial tumours of the bladder are often divided into benign papillomas and malignant papillomas. Perhaps the commonest suggestive clinical signs of malignancy in these growths are:

- (1) Induration.
- (2) Slough.
- (3) Resistance to fulguration.
- (4) Single tumour-multiplicity very often means benign tumour.
- (5) Age of patient—those in older patients are more probably malignant.

Geraghty classifies these tumours as:

Tumours of epithelial origin: (Papilloma, adenoma, benign malignant); (cysts, carcinoma, papillary, squamous, adeno-).

Tumours of connective tissue origin: Sarcoma, myxoma, fibromyoma, angioma.

Tumours of muscular origin: Myoma.

Heterotopic: Rhabdomyoma, hydatid cysts, dermoid cysts, chondroma.

Buerger divided them still farther into:

- (1) Papilloma.
- (2) Infiltrating papilloma.
- (3) Papilloma with carcinomatous change.
- (4) Primary papillary carcinoma:
 - a. Papillary polypoid type.
 - b. Secondarily infiltrating type.
- (5) Primary squamous-celled carcinoma:
 - a. Infiltrating type from papilloma.
 - b. Squamous type from papillary tumours.
 - c. Secondarily prostatic tumour, metastasis from without.

In the main these classifications are the same. Personally I like the general plan of Christeller, and divide these growths as follows:

(1) *Typical Papillary Fibroepitheliomas (benign)*.—Their most important sign is that the epithelial proliferations remain restricted to the mucosa, and are thus directed only towards the interior of the bladder. There is no tendency

to grow into the deeper tissues, and these tumours are therefore displaceable on their base.

(2) *Typical Papillary Fibroepitheliomas (malignant)*.—These tumours although presenting certain histological irregularities, in the pigment and basement membrane, are without the most important signs of malignancy, in the form of destructive growth, they penetrate nowhere into the submucosa or muscularis, and do not give rise to metastases. They are often reported as benign undergoing malignant change.

(3) *Papillary Carcinoma*.—Characterized by a destructive deep growth into the muscular layer. The superficially papillary structure closely resembling fibroepithelium is deeply alveolar, as in all other carcinomas. The histological diagnostic examination fully reveals the existence of typical cancer cells and destructive growth in the second and third stage, so that the diagnosis of malignancy can be positively rendered. The diagnosis of benignity in these cases affords information only of the segment of the tumours examined, and not of the growth as a whole.

(4) Aside from papillary cancers, *solid cancers* also occur in the bladder, being histologically in part solid cellular medullary cancers, in part scirrhouss or alveolar types.

In the literature of the subject the inoperability of a large proportion of cases of bladder tumours is rightly attributed to the length of time which elapses between the first symptom and the operation. The cystoscope has made the diagnosis of the presence of bladder tumours so easy that there is absolutely no excuse for the long histories with no treatment which we find in those cases. The history of our own cases varied from two weeks to thirty years. It is not the absence of symptoms that causes havoc, but it is rather the failure to appreciate the importance of early symptoms. Blood in the urine is never physiological; it is a symptom of some pathological condition, and it demands instant investigation. An analysis of 821 haematuries in our clinic showed that 192 were due to calculi, 113 to tumours, eighty-eight to renal tuberculosis, and 143 to surgical infections of the ureters and kidneys, or, excluding the urethra, 536 cases out of 761, that is over seventy per cent. were caused by calculi, tuberculosis, cancer, or surgical lesions of the kidney; while the other thirty per cent. most certainly required investigation. The

great importance of subjecting these patients to a careful and thorough examination is at once apparent.

With the cystoscope in the bladder, unless the bleeding is profuse, the growth within the bladder can easily be detected, and the surgeon can frequently tell whether the tumour is benign or malignant from the cystoscopic picture.

The benign tumours are delicate, floating, warty growths of pale pink colour, the vessels in the fronds often being visible. The different branches of the tumours float about in the irrigating fluid and the neighbouring mucous membrane of the bladder looks absolutely normal.

On the other hand malignant papillary growths are often single, there may be necrosis of the masses, or they may be partially covered with exudate, the fronds are more or less united presenting the appearance of a mixed papillary and solid growth, and the adjacent mucous membrane of the bladder is often oedematous and rugated—so-called bullous oedema. Again, benign tumours melt away under fulguration treatment, whereas the malignant ones are much more obstinate. Vaginal or rectal examination, which should regularly be made in all doubtful cases, often will detect the increased resistance of the infiltration of a malignant growth of the base of the bladder.

There is also another cause for diversity of results in the treatment of these growths. A tumour in the vault of the bladder is altogether a different proposition from a growth surrounding the vesical neck, regardless of what type of treatment is used.

In our own small series of cases, we do not attempt to advance anything new in diagnosis or definite in treatment but only to add our results to those of others.

Our list includes:

Total number of cases	228
Total benign, microscopically and clinically...	110
Number microscopically malignant	85
Number clinically malignant (not microscopically confirmed).....	33
Total malignant tumours	118
Males	93
Females	25
Total Males Females	
Papilloma, malignant, clinically...	30 23 7
Papilloma, malignant micro- scopically	9 8 1
Papillary carcinomas	70 60 10
Carcinomas, medullary, etc.	8 5 3
Sarcoma, mixed growth	1 1 0

	<i>Age</i>	
	<i>Youngest</i>	<i>Oldest</i>
<i>Papilloma:</i>		
Males	33	71
Females	26	62
<i>Carcinoma:</i>		
Males	30	88
Females	23	71
<i>Sarcoma:</i>		
Male	31	

The pulse, temperature and respiration curve in uncomplicated cases, is no aid to diagnosis, showing no constant variation.

Complaints according to frequency and order of occurrence:

Hæmaturia.—Chief complaint in 75 per cent. of cases, and usually the cause for seeking relief.

Frequency.—Chief complaint in 25 per cent. associated in 40 per cent to 60 per cent.

Dysuria.—Chief complaint in 10 per cent. of cases associated in 15 to 20 per cent.

Associated Complications.—Pain in loin; incontinence; pain in perineum and genitalia. Suprapubic pain not common.

Relief was sought by the patients any time from two weeks to thirty years after the onset. If there was copious initial hæmaturia, aid was sought immediately. The longer cases, in many instances, proved to be papillomata, which had undergone malignant changes.

In the early stages carcinoma is a local disease. The rational treatment, theoretically at least, is complete and radical excision. In the bladder the disease often remains local for a long period, and does not metastasize readily. Every effort, therefore, should be made to bring these patients for examination early, that we may get rid of the local involvement before it becomes a general condition.

As a great many cases occur in the sixth, seventh, and eighth decade, the history and clinical picture are often combined and associated with signs and symptoms of prostatism. As many of those cases give a history of several years, the age curve does not represent the true curve for the beginning of the bladder tumours.

It would appear that the gastro-intestinal manifestations of bladder tumours, as compared with renal lesions, are comparatively few.

Some individuals complained of constipation, this usually proved to be an anatomical effect. Symptoms of hypersecretion (gas eructations, hyperacidity, and the like) are not the rule, while it is interesting to note that in nitrogen retention, due to conditions of and within the bladder, the urea nitrogen may go to three to

four times normal; the creatinine remaining stable and fixed. The gastro-intestinal symptoms in these instances are few.

Loss of weight and strength are marked only in the advanced cases; while the blood pressure findings vary greatly, being low, frequently, in the advanced carcinomata.

Physical Examination of the Genito-Urinary Tract.—The ordinary examination discloses little that is diagnostic. Abdominal examination may be said to be negative. Occasionally there is suprapubic tenderness, usually present when there is an associated acute cystitis.

Rectal examination in the case of papilloma of the bladder is practically always negative. In the case of carcinoma of the bladder, the infiltration of the wall may cause the mass to be palpable, while nodules in and about the prostate may be significant.

The urinary findings are as one might expect; there is often macroscopic blood; the specific gravity usually shows good variation; associated nephritis, as evidenced by casts is not marked; albumin is present from a slight trace to a considerable degree; sugar was found in only one case in the series, it being a true glycosuria. Microscopical examination shows pus and red blood cells in varying degrees. In rare cases, pieces of tissue were passed in the urine, and were of diagnostic value. The phenolsulphonephthalein estimations are usually below normal but, as in cases of the blood chemistry figures, this condition improves, following the establishment of free drainage.

Sufficient blood findings are not available to be of value but in several cases of carcinoma there was a slight leucocytosis. There is usually a varying secondary anaemia. In addition to the above there may be the usual derangement of the various systems. Only in one case was there a positive Wassermann.

Cystoscopic Examinations.—The findings on cystoscopic examination usually enable one to make a diagnosis. Occasionally a chronic inflammatory condition which has undergone degenerative or productive change, or extensive bullous oedema, will confuse or complicate the diagnosis.

TREATMENT

Papilloma of bladder, malignant	39
Repeated fulguration	19
Cured	12
Improved	7

Cystotomy and cautery	6
Cured	5
Improved	1
Excision	6
Cured	4
Improved	2
Cautery and radium	5
Cured	4
Improved	1
Not treated	3
<i>Carcinoma</i>	78
Inoperable, not treated	27
Excision	14
Cured	7
Recurrence	6
Died	1
Excision and cautery	3
Cured	2
Recurrence	1
Excision and radium	4
Cured	2
Recurrence	2
Cautery and radium	6
Cured	4
Recurrence	1
Died	1
Excision and transplantation of ureter	1
Cured	1
Excision and transplantation of ureter, and radium	1
Died	1
(From metastases 5 months later)	
Cautery and fulguration being only pal- liative efforts in advanced cases.....	11
Cured	1
Recurrence	4
Not improved	5
Died	1
Deep x-ray of inoperable cases	6
Improved	2
Not improved	3
Died	1
Suprapubic drainage for advanced in- operable conditions	5
Not improved	1
Died	4

The mortality includes death within three months of discharge. So-called cures were all followed for six months to seven years, generally from one to three years.

In the treatment by high frequency currents the bipolar method was used altogether; the response in some papillomas to fulguration is very striking. I do not believe the high frequency is of any use in carcinomata except perhaps as a haemostatic, nor have I found it satisfactory in extensive tumours at the vesical neck, mainly

on account of the difficulty of control in this area.

In cases of very extensive papillomatosis of the bladder the cautery through a suprapubic incision gives more satisfactory results. In removing these growths by the suprapubic route the operator must remember the property of epithelial cells to grow on denuded surfaces. Therefore, we must develop a method which prevents implants; we must destroy the tumour *in situ*, sponge as little as possible, and protect the prevesical space and the wound in the abdominal wall, so that no accidental implants may result.

In the surgical technique for the removal of bladder tumours, we have used for a number of years the method of approach favoured by Beer, Squier, and others, namely the extraperitoneal liberation of the bladder permitting the drawing of the organ well out of its peritoneal and perivesical coverings, so that when the bladder is opened it is about two-thirds out of the abdomen.

Briefly the technique is as follows:—The bladder is irrigated gently with warm boric or salt solution and the patient is put in Trendelenberg position. A free median suprapubic incision is made down to the bladder, which is not opened at present. The peritoneal fold is carefully separated, the urachus is liberated, clamped, cut and the upper stump ligated. The lower stump is used to draw the bladder towards the symphysis while the operator separates the peritoneum from the posterior wall of the bladder. The bladder is now well through the wound, and the abdominal wound is now well protected with gauze. The bladder is then opened almost anywhere, depending on the location of the growth or growths, and with the electric cautery the tumours are destroyed *in situ*, with as little manipulation and sponging as possible. If the case is one of benign papillomatosis complete destruction with the cautery well into the bladder wall is sufficient. If, however, the cystoscopic and microscopic examination, and the palpation at the operation suggests malignancy, the underlying bladder wall must be widely excised. If the tumour involves a ureteral orifice it is best to excise the tumour and about 2 cm. of ureter. The ureter is reanastomosed with the bladder by puncturing a healthy part of the

bladder wall and drawing the ureter through for about 1 cm. after splitting it into two lips and attaching it by catgut suture to the bladder.

The incision in the bladder wall, and in extension cases, the inside of the bladder, is swabbed with carbolic and the wound and bladder filled with alcohol for three minutes, with the object of coagulating any viable tumour cells which may be about. The table is now returned to a horizontal position and the wound closed with a suprapubic tube to the bladder, and an extravesical cigarette drain is placed along the operation incision in the bladder and through suprapubic wound.

In the radium treatment emanation seeds were used, and inserted through a hollow needle.

When deep x-ray treatments were given, they consisted of a series of four treatments of 200 kilovolts, five milliamperes, sixteen inches distant, and exposure for sixty minutes. The rays are filtered through one millimetre of copper, and one millimetre of aluminium. One exposure is given over the symphysis, one over the sacrum, and one over the right and left sacro-iliac joints. This is repeated at the end of six weeks.

In conclusion, our experience has taught us that certain considerations must be emphasized with care in the attempt to solve this grave problem. The importance of recognition of blood in the urine cannot be overestimated; the examination of the prostate is of equal necessity; the age and development of the growth must be carefully decided; the location of the growth must be definitely settled; freer and more open surgical methods, even in cases of recurrence, must be followed; and finally a more thorough and reliable follow-up system, extending over the remainder of the patient's life must be adopted. If these considerations and theories are followed with careful practice, our experience convinces us that the ravages of bladder cancer will greatly diminish.

BIBLIOGRAPHY

- BUERGER, LEO, N. Y. M. J., 1916, vol. eiv, 841.
BARRINGER, B. S., *Surg. Gyn. and Obst.*, 1920, vol. XXX, 86. LOWER, *Annals of Surgery*, 1922, 352. KAUFMANN, *Speszielle Pathologische Anatomie*, 1922, 1127. MACKENZIE, D. W., *Surg. Gyn. and Obst.*, 1924, 155-156. OERTEL, Personal communication. BEER, EDWIN, *Annals of Surgery*, 1921, vol. lxxxiii, 72. CHRISTELLER, *Zeitschrift für Urologie*, 1925, vol. xix, Heft. 2, 103.

THE INFECTIOUS ARTHRITIDES*

A. MACKENZIE FORBES, M.D.

Clinical Professor of Orthopaedic Surgery, McGill University, Montreal

AND

LAWRENCE RHEA, M.D.

Associate Professor of Pathology, McGill University, Montreal

PAPER I.

THE subject of the chronic infectious arthritides has been for decades, perhaps centuries, inseparably bound up with the subject of acute rheumatism, or, as I like better to call it, rheumatic fever. If then, we would study the infectious arthritides, we must study with these forms of arthritis the subject of acute rheumatic fever.

ACUTE RHEUMATISM

Rheumatic fever is an acute infection depending on an unknown infective agent. It is characterized by arthritis, myocarditis, and endocarditis. Rheumatic fever is rarely seen in the aged. It is an infection of young adults. Statistics tell us that four per cent. of cases are seen under fifteen years of age, and forty-eight per cent. from fifteen to twenty-five years of age.

Rheumatic Fever in the Adult.—Onset. The onset is abrupt. One or more joints are usually affected. The joints are attacked successively. There is extreme pain. *There is no chronicity.*

Recurrence.—No immunity is secured by an attack, but rather a predisposition, as in pneumonia, erysipelas, etc.

Symptoms.—While the onset is usually abrupt, it is sometimes preceded by vague symptoms, often *tonsillitis*. Within twenty-four hours the disease is fully manifest, the temperature ranging from 102 to 104 degrees.

History.—The joints are not attacked together but successively.

Infection.—The history of the disease suggests an infection—the character of the fever, the arthritis, the tendency to relapse, the sweats, the anaemia, and the leucocytosis, above all the

liability to endocarditis—all suggest an infection; yet strange to say, rheumatic joints *never suppurate*.

Treatment.—Salicylic acid and its derivatives have a specific action on the symptoms of this infection. They do not influence the disease itself.

There are various important differences between rheumatic fever as seen in the adult and that seen in childhood.

Rheumatic Fever in Children.—Our colleague, Dr. H. B. Cushing, at a clinical meeting of our Children's Hospital in Montreal, recently stated: "In children rheumatic fever is a clear-cut specific disease, revealing itself by signs in many organs and tissues, lasting intermittently for years, and leading to permanent invalidism or death in a large percentage of cases. If the whole history of any patient is worked out one gets the conception of a many-sided disease unlike any other disease, but comparable with syphilis or tuberculosis in its chronic course and manifold manifestations, and easily recognizable as one prolonged infection with recurrent exacerbations."

To prove his words he cited the history of a girl of nine years who was previously healthy. She developed scarlet fever on July 20, 1924. After the usual five days of fever she was well for a week, and then, on August 3rd, developed multiple arthritis with fever. These symptoms subsided under the use of salicylates, but in September she again developed an arthritis. It was then recognized that she was suffering from endocarditis. In October she developed chorea, and was admitted to the Children's Memorial Hospital. On examination she was found to have multiple subcutaneous fibroid nodules and a serious cardiac lesion. *The sequence of events was scarlatinal angina, multiple arthritis, endo-*

*This paper was prepared for the meeting of the Western Ontario Academy of Medicine, held on June 17, 1925, at London, Ontario, and kindly read by Dr. A. J. Grant in the absence of Dr. Forbes.

carditis, fibroid nodules, and chorea. It was an infection starting in the throat and involving successively the joints, the heart, the connective tissues, and the nervous system.

"The association of the acute rheumatic infection with that of scarlet fever has been noted for centuries, and is especially interesting in view of the recent identification of the scarlet fever streptococcus." Nevertheless it is doubtful whether a variety of this streptococcus causes rheumatic fever, or whether the scarlet fever allows the rheumatic fever organism to become active, just as measles predisposes to active tuberculosis. Observers are inclined to agree that the infection of rheumatic fever usually begins in the throat. The tonsils are apparently a primary focus or a portal of entry.

Cushing, speaking of the arthritis of rheumatic fever, says that it has three characteristics which definitely distinguish it from all other forms of arthritis.

First; it flits about from joint to joint, affecting one set of joints one day, and another a day or two later. *Second;* no matter how acutely inflamed a joint is, how much effusion there is in the joint, or how much thickening of the tissues about the joint, there is never any permanent disability or alteration of the joint structures remaining. *Third;* if salicyl compounds are given in sufficient quantities, the fever falls and the joint inflammation clears up. But to get this effect the system must be saturated with salicylates; small doses are useless. Salicylates act very much in rheumatic fever like iodides in syphilis, relieving certain symptoms without curing the disease.

Let us add to these three characteristics a fourth: joints affected by acute rheumatism never suppurate.

THE CHRONIC ARTHRITIDES

Chronic infectious arthritis has been called chronic rheumatism, rheumatoid arthritis, osteoarthritis, chronic gout. Other names also have been used to describe these infections.

There are certain similarities between acute rheumatic fever and the chronic infectious arthritides, and there are some characteristic differences. Acute rheumatic fever is apparently an infection which often begins in the tonsils. In the chronic arthritides, if it is possible to find a source of infection, this source is often

found in the tonsils. In the chronic infectious arthritides the condition does not tend to flit from joint to joint. These conditions are chronic and they tend to injure the joint affected. Suppuration sometimes follows in a joint affected by the chronic arthritides.

We believe that chronic infectious arthritis is not a specific infection, as is rheumatic fever, but is characteristically a secondary manifestation, either due to an extraneous focal infection, or a somewhat similar source of infection. Chronic arthritis is said by some to be due to the absorption of toxins and bacterial products from one or more remote organs or parts of the body which may be the seat of a more or less chronic bacterial infection, and against which the defences of the body have lost their power of resistance. It is commonly stated that the source of infection may be in the teeth, gall-bladder, sinuses, genito-urinary system, tonsils, rectum, or where not; nevertheless it might be wise at this point to accentuate the fact that it is possible that the intestines themselves may, in some cases, be the portal of entry of the causative organism.

Recently writers have been describing the endocrine element in arthritis. One writer says: "It is almost universally accepted that the greatest number of chronic cases are infectious in origin. A smaller number are possibly due to exhaustion or continuous nervous strain. These cases may affect the endocrine balance, and the final result may be arthritis."

In a series of four hundred cases cited by Pemberton, three times as many of the patients recovered in whom foci were present as did those in whom the foci had been removed. In Montreal we have always taught that the removal of a *focus* of infection may not necessarily remove the *source* of infection. In this respect may we say:—(1) A focus may be only part of the source of infection, or it may be coincident with the source; (2) the disease may have become a chronic septicæmia; (3) the focus may have ceased to operate; (4) the focus may have been the source, but the connection between the source and the disease may have ceased; (5) the portal may be an altered physiology.

About two or three years ago a medical man sent me a boy in his early twenties suffering from definite so-called infectious arthritis. We admitted him into the ward of a hospital. Care-

ful search was made for a focus of infection. Infected tonsils were found; they were removed. Synchronously with the search for the source, careful treatment was carried out, and when the boy seemed much improved, he was allowed to return to his home in Rhode Island. Soon he was able to undertake work. Last fall, when "looping the loops," he was seized with sudden pain in his back. In a week's time he was again laid up with an attack of infectious arthritis. This made an invalid of him, and therefore he has recently returned to Montreal to see whether something can once again be done for him.

This case is a practical illustration of the fact that all possible primary foci may be removed, and yet there may continue to be a secondary infection in the patient. This tempts one to ask: May not an infection be the source of these conditions, yet by the time we discover this source, may we not be dealing with a chronic, low-grade septicaemia, or may the organism be lurking in the joints or elsewhere, only to become apparent under favourable conditions? This question suggests the indication for the treatment by vaccines which will be discussed later.

Again, in many cases, search as we may, we cannot find a focus of infection. May not the *intestinal mucosa* act as a portal of infection in some of these cases? If the intestinal mucosa may be a portal of infection for any disease, why should it not especially be so in the arthritides, because in the chronic arthritides our attention is drawn to the intestines by certain characteristics of these infections. (a) The influence of diet; (b) the part which lavage and operations on the colon play in these conditions; (c) the accompanying disturbed function in certain of the endocrine glands, which disturbance may be due, as from experiments we know it frequently is, to altered intestinal metabolism.

It is not a new suggestion that the cause of the infective arthritides may, in some cases, lie in the intestinal tract. Indeed the work of Lane and more than a score of others, included among whom were not only his disciples, but independent workers, was inspired by this doctrine. According to most of these authorities, however, the alterations in intestinal function were due to macroscopic changes or conditions, and not to the unseen and still undiscovered changes in living cells or their function.

PRINCIPLES OF TREATMENT

Those who have followed these suggestions will appreciate that until we can definitely state what etiological factor obtains in a definite case, we cannot hope to base our treatment on the sure foundation of natural science.

Treatment then, should aim at the elimination of all apparent sources of infection, remembering that in some cases the portal of entry may be in the cellular lining of the digestive tract, and as yet we have no certain means of finding such lesion. This suggests a question. Can we not find what organism is affecting the patient without actually finding a focus of infection? If it were possible to do this, we could perhaps stimulate the formation of antibodies by vaccines, or neutralize the toxins which may be responsible for the arthritis.

In secondary or tertiary syphilis we do not isolate the organism in order to learn what is the cause of the symptoms from which the patient suffers, but we are able by employing such tests as the Wassermann to say with some certainty that syphilis exists. If then, by somewhat similar methods—by a serological study—we are able to learn what organism is perhaps responsible for the patient's lesion, can we not help nature by stimulating resistance and so increasing on this occasion the antibodies? Studies have been made on these lines which will be briefly mentioned by my colleague, Dr. Rhea. Nevertheless one may point out the practical application of the theories of an infectious origin of these conditions.

PRACTICAL TREATMENT

What can be done in a practical way within the limitations of our present knowledge to help patients suffering from the various chronic arthritides? The direct or indirect cause can perhaps be eliminated. The contributory causes or effects of this infection, such as decreased sugar tolerance, decreased blood calcium, and decreased leucocytic response can be combated. Again, when we realize how frequently the intestine is in fault in these cases, we may endeavour to improve intestinal function.

Decreased antibody response may, in some cases, be stimulated by vaccines and perhaps in other ways.

Lastly, the treatment of local symptoms will always be an important part of our duty.

In closing these remarks on the subject of chronic arthritis I would accentuate the differences between acute rheumatism and chronic arthritis.

Acute rheumatism flits from joint to joint, rarely remaining in one joint more than a few days; the chronic arthritides affect one or more joints, usually for a considerable number of days. Acute rheumatic fever never causes impairment of the joint; the chronic arthritides often cause permanent loss of function. Acute rheumatic fever never causes suppuration; the chronic arthritides often cause suppuration. Acute rheumatic fever is markedly influenced by the salicylates; the chronic arthritides are not influenced by salicylic acid or its compounds.

While I would emphasize my belief in the fact that both acute rheumatic fever and the chronic arthritides are due to an infection, I would say that the source of the infection may be most elusive.

Macallum, in 1922, expressed his conviction that the greatest advances in medicine in the next three decades will be based on the results of investigations of the biochemistry of the intestinal mucosa, which he regards as the great gateway to diseases of the body.

In serology also there are many possibilities; let us not neglect them.

PAPER II.

The application of the more exact methods of laboratory diagnosis to the group of arthritides and their allied conditions has comparatively recently received the careful attention of those skilled in the newer laboratory methods. The interest of these workers, like our own, has been primarily to establish the real etiology of the conditions under consideration, with the belief that a more rational therapy based upon etiology would be evolved, and the hope that such a therapy would prove successful. Encouraging results have been obtained in the field of serology. For a long time there has been a well-grounded, if not proven, belief that streptococci are an important factor in the conditions under consideration. This belief has not been based entirely upon clinical observations. It has been supported by laboratory studies. The rôle that these organisms play might be either primary

or they might act as secondary invaders. The very fact that the streptococci, like the meningococci and the pneumococci, constitute a family of organisms some of the members of which are so closely related that it is almost impossible to separate them, has added great difficulty to the work of pathologist and bacteriologist. For this reason serological methods, similar in principle to those used in the more complete identification of meningococci and pneumococci have been employed in arthritis with special reference to the streptococci.

The earliest work along these lines was done by Hastings in 1913. Since then Swift, Thro, Richards, and others have contributed to the subject. Of more recent date is the work of Burbank and Hadjopoulos.* These workers have developed a technique for the application of the deviation of the complement when using streptococcus antigen, that give results which, in their hands, are most encouraging. As a result of a large series of tests they have suggested a new classification of the arthritides. In their paper they say:—"As the result of more than a thousand complement fixation tests, using the above technique with various strains of streptococci as antigens, we have made a serological classification of infective arthritides. This classification embraces arthritic and rheumatoid conditions that always have been loosely classified, and from the serological view point divides them into three clinical entities: (1) exudative periarthritis, isotrophic in type; (2) exudative periarthritis anisoatrophic in type; (3) productive osteo-arthritis, hypertrophic in type."

Their work has convinced them that not only do streptococci play an important rôle in the arthritides, but special streptococci are the important factor in special types of these conditions. In Type 1, haemolytic streptococci are the important ones. In Type 2, haemolytic streptococci, but of a different type than in Type 1; and in Type 3, the viridans type is the important one. Judging from their tables encouraging results have been obtained from therapeutic measures based upon their findings.

This hopeful line of work is encouraging, and has stimulated some of us to undertake an investigation along similar lines.

*Jour. Am. Med. Ass., Feb. 28, 1925.

RECTAL ANÆSTHESIA IN OBSTETRICS*

JOHN D. GRAHAM, M.D.

Junior Assistant, Obstetrical Service, Toronto Western Hospital, Toronto

BUT a short period of time had elapsed after the discovery of the anæsthetic properties of ether, before experimenters in the realm of anæsthesia began to devote their energies to the possibilities of anæsthetizing patients, not by the inhalation method, but by the introduction of ether into the rectum and large bowel; the first series of cases, using this form of anæsthetic induction, was reported from St. Petersberg by Pirigoff¹ in 1847.

His technique was merely to force warm ether vapor into the rectum. The great majority of his eighty-one patients suffered post-operatively from varying degrees of intestinal irritation, and two deaths reported were due to a very severe colitis. As a result of these accidents the technique did not gain any favour in the field of anæsthesia, and was not heard of again for over fifty years.

In 1905, Cunningham, of New York, reported a series of cases in which rectal anæsthesia was used, air being employed as the vehicle for the ether, and since that time this form has become more or less popular with various surgeons and anæsthetists, being particularly used in the surgery of the mouth, throat, respiratory tract and the chest.

Some eight years later, Cunningham², in collaboration with Sutton, evolved the "oil-ether mixture" which required a less elaborate technique, and had a shorter induction time than the previously used air ether mixture; Sutton reported a series of 100 cases with intestinal irritation in but five.³ At the present time the oil-ether mixture is the one universally used, and the literature from time to time contains fairly large series of cases giving usually very gratifying results.

It was not until 1923, however, that the possibilities of this form of anæsthesia in the field of obstetrics were considered. Thaler and Huber at this time presented a report of a considerable number of deliveries where rectal

anæsthesia had been used. Their technique differed in no way from that used for surgical cases; the great drawback to their method was the fact that in the great majority of cases one administration of oil-ether was not sufficient, and the procedure had to be repeated, sometimes as many as five times.

In the same year Gwathmey, of New York, devoted a considerable portion of his time to an attempt to find the most suitable obstetrical anæsthetic that could be used per rectum. He devised what he terms "A synergistic analgesia," that is, an analgesia that is not the result of one drug, but the combined result of several drugs working in unison. His method is now being used as a routine at the New York Lying-in Hospital.⁴

Having had some considerable experience with this type of obstetrical anæsthesia while a junior house-surgeon at the New York lying-in hospital, and being more than satisfied with the results obtained, I have, with the consent and co-operation of Dr. R. W. Wesley and Dr. Magwood, used this form of anæsthesia as far as possible on every ward patient in the Alexandra Obstetrical wing of the Western Hospital.

The technique of giving the anæsthesia consists of two main components,—a hypodermic injection and an instillation per rectum.

The hypodermic consists of one-sixth of a grain of morphine sulphate dissolved in 2 cc. of a 50 per cent. magnesium sulphate solution. The latter is prepared by dissolving one gramme of the chemically pure magnesium sulphate in 2 cc. of distilled water, giving the desired 50 per cent. strength. This solution is then sterilized and sealed in ampoules.

The hypodermic may be given into the upper arm, thigh or buttock. It should not be injected subcutaneously, but deeply, as magnesium sulphate if given subcutaneously in strong solutions has a tendency to cause a necrosis and sloughing of tissues about the site of injection, although I, personally, have never seen this.

The part the magnesium sulphate plays in

*Read before Section of Obstetrics and Gynaecology, Academy of Medicine, Toronto, March 5, 1925.

the synergistic analgesia is this:—The salt is known, when introduced into the body tissues, to cause a general systemic relaxation, hence its use in convulsive seizures, and its intravenous or intrathecal injection in cases of tetanus or eclampsia. More important, however, is the fact that this drug has the peculiar power of increasing very greatly the analgesic effect produced by other drugs, and that is its main purpose in this form of obstetrical anaesthesia.

The instillation to be given per rectum consists of a four ounce mixture containing twenty grains of quinine hydrobromide dissolved in two drachms of alcohol, two and a half ounces of ether, and the remainder of the four ounces, olive oil. The quinine dissolved in alcohol is placed in the mixture merely to insure continued uterine contractions, although I think this, in the great majority of cases, is unnecessary.

To draw up any routine plan of procedure regarding the time of giving these two parts of the treatment, is a matter of no little difficulty, mainly because patients are admitted to the hospital in such varying degrees of labour. With one it is a matter of minutes until the delivery is completed; with the next, probably hours before the third stage is over. The method we follow, as far as possible, is this:—The hypodermic is given when the patient is in active labour; that is, contractions with definite pain occurring every four to six minutes and lasting about sixty seconds, and when vaginal examination shows a dilation of the cervical os of about two or three fingers.

Every case is a law unto itself as regards the period of time which should elapse after the hypodermic before the instillation is given. Should the patient show a response to the hypodermic medication by a decrease in the amount of pain, then the instillation may be withheld for a period of an hour or an hour and a half. However, if there is no appreciable sedative result to the patient, then the instillation may be given in twenty minutes, or half-an-hour.

The necessary apparatus for giving the anaesthetic is very simple, consisting of an ordinary granite or glass funnel, a foot of rubber tubing, a two-inch glass connecting rod and a large sized rubber catheter with several additional openings nicked in it to promote a little faster flow of the oil-ether mixture.

The technique followed in giving the instil-

lation is as follows:—The patient should have had the lower bowel thoroughly emptied by an enema a short time previous to giving the anaesthetic. She is then placed on her left side in a modified Sim's position, with the right limb flexed at hip and knee. About an ounce of warm sweet olive oil precedes and follows the giving of the instillation proper. The presence of the oil serves two purposes. First, ether may irritate and cause a burning sensation if the rectal mucosa is hypersensitive, or if haemorrhoids are present. If present, this burning will be but momentary, being almost instantly allayed by the soothing action of the warmed oil; and secondly, the instillation being over 50 per cent. ether is very volatile and runs very easily and quickly, but being sandwiched in between two layers of oil this tendency is greatly overcome. The funnel and tubing are then filled with the warm oil, and all air bubbles excluded before the introduction of the catheter, as any air in the rectum will cause distension and a bearing down sensation to the patient, which is, of course, to be avoided.

The catheter is then introduced into the rectum for a distance of between four and six inches. Should the fetal head be low down, it is imperative that the tubing be placed above the level of the oncoming head, for then the head will act as a ball valve,—the harder the pains the more completely the head will press on and collapse the rectum, and will more surely tend to materially aid the retention of the oil-ether mixture.

The fluid is run in by gravity alone, usually taking about four or five minutes. If the pains are severe during this period of time, the tube may be temporarily clamped by the fingers during the height of the contractions. As soon as all the fluid has entered the rectum, the tubing is carefully withdrawn between pains, and then either the attendant or a nurse should sit by the patient and with a folded towel press the buttocks together, and pressure should be exerted upwards with the towel during the next few pains. The patient should be left as quiet as possible, all unnecessary noises about her eliminated, and any conversation carried on in low tones. The lights should be dimmed, and possibly an eye-shade of gauze placed over the patient's eyes.

Most patients will for a minute or two follow-

ing the instillation have the desire to empty the lower bowel. I think, personally, that the success of the treatment depends very greatly on the obstetrician obtaining the full co-operation of the patient before the anaesthetic is introduced into the rectum. She should be told why she is being given the treatment; that the injection is to be retained; that if she does retain it she will go to sleep, have no more pain and wake up when everything is over. Understanding this, and co-operating as fully as possible, patients will not have the slightest difficulty in retaining the instillation.

The effects are noticeable in an extremely short time, because the absorptive area of the large bowel is so great that the ether is absorbed at an even rate and becomes systemic about twice as quickly as in the inhalation method. So, very often the ether will be tasted before the injection is completed; the odor will be on the breath in four or five minutes, and by fifteen minutes at the outside, usually ten, the patient is either very stuporous or fast asleep. Labour is not prolonged. The obstetrician may sit by the side of his sleeping patient, and may feel the uterine contractions going on just as regularly, just as frequently and just as forcibly as before, and the strength and frequency will increase proportionately as the second stage progresses.

The effects of this synergistic analgesia will last from two to six hours, depending on the patient's susceptibility to ether, and depending on whether or not the instillation is completely retained.

Should there be some disproportion between the size of the foetal head and the maternal pelvis, some malpresentation or a dystocia due to any cause, resulting in a prolonged labour, then it may be necessary to repeat the hypodermic, omitting the morphine sulphate; that is, if the effects of the instillation are beginning to wear off and it is thought that it may be some little time before delivery, 2, 4, or 6 cc. of the magnesium sulphate solution may be given by hypodermic. This will usually carry on the effect of the analgesia for another hour or so.

Naturally, the question arises, what dangers are there to the mother or child in this mode of anaesthesia? The anaesthesia, in my experience, is without any danger to the mother or child. Let us consider briefly the various items in the treatment.

In the *Jour. Am. Med. Ass.*, August 5th, 1921, there was reported from the Presbyterian Hospital, New York, a series of 200 cases in which as much as half an ounce of the magnesium sulphate was given subcutaneously with no disastrous effects. We would have to give 32 cc. of our solution to equal even this safe amount, and the most ever given is 8 cc. So the magnesium sulphate may be considered harmless.

One-sixth of a grain of morphine given in the later part of the first stage is, I think, without danger. As for the ether, the usual amount given to surgical patients where rectal anaesthesia is being used, varies from three to six ounces, usually four or five ounces being the amount. In the obstetrical technique only two and a half ounces are given. The latter probably accounts for the fact that we do not get marked tenesmus, or a colitis with bloody stools that sometimes occurs in the surgical cases, although in some of our cases there is a slight straining by the patient which is bothersome, coming on an hour or two after delivery and lasting for about half an hour or so.

There is usually a good bowel movement the first day after delivery, which I think is a slight advantage. An advantage of greater importance, however, is the fact that a 50 per cent. ether solution in the rectum will in ten minutes kill all colon bacilli in the lower bowel, thus minimizing the chances of a post natal infection, especially in cases where there has been a repair to the perineum.

I have personally used this treatment in the neighbourhood of one hundred and fifty cases, and have had no still-births in that series, and only three of the babies had to be resuscitated. However, there was one case in which only the hypodermic was given and a still-birth resulted, but as the case was one of version and breech extraction, complicated by both arms being above the head, I do not think the hypodermic could be blamed, and there have been no still-births in the series where the whole cycle was given.

Vomiting occurred in two mothers. In both cases the woman had eaten very heavily a short time previous to the administration of the anaesthetic, evidently looking forward to a week or ten days of semi-starvation while in the hospital. Perhaps another half-dozen have complained of a nausea that was only temporary, however.

There are practically no definite contraindica-

tions to its use. It has been given safely in pre-eclamptic cases and in cases with cardiac complications of a type that have not become decompen-sated. It should be withheld in cases that are likely to be delivered by Cæsarean section and are being given the so-called "test of labours," or in cases of premature delivery where it is desirous to safeguard the premature to the greatest possible extent.

Having so far dealt only with the advantages and benefits of this anaesthesia, it would be wise to dwell for a moment on the disadvantages and the drawbacks, for although greatly outweighed and outnumbered by the advantages and benefits, still they do in a small way exist.

The greatest drawback, in my mind, is that occasionally (five times in my experience) the patient becomes irrational and sometimes highly excitable under the effects of the analgesia. This may show itself only in incoherent speech and mild delusions or hallucinations, or the patient may become extremely violent and very difficult to handle. This result is not at all desirable in a private home, occurring as it does after the obstetrician has told the anxious relatives or friends what peace and calm the instillation will bring to the patient. However, wild as the patient may be, labour is not prolonged and there is present relief from pain.

Once the patient has become anaesthetized, she should be watched fairly carefully, especially if she should be a multipara, for labour may advance and terminate very quickly while the patient is fast asleep. For this reason a nurse who is experienced in obstetrics should always be present when the case is being conducted in a private residence.

These two facts constitute the only real drawbacks to this form of obstetrical anaesthesia.

Like the New York routine, we attempt to grade our cases in accordance with the success of the treatment in relief of pain to the mother, the ease of delivery and the condition of the baby. I regret that we have not a larger series of cases to report from the hospital here, but owing to temporary quarters, clinical material has been scarce than we would have wished for, and we have been unfortunate lately in that the majority of patients when admitted have been too far advanced in labour, making the use of the anaesthetic unwise.

However, in a series of twenty-seven cases,

consisting of nine primiparæ, eighteen multiparæ, the complete cycle was given in twenty cases, the hypodermic only in seven. Of the twenty receiving the whole treatment, nine were graded "A" results; seven "B" results, and four "C" results; that is, 80 per cent. were "A" or "B", which means a successful result. In about 150 personal cases in New York and Toronto, between eighty or ninety per cent. were "A" or "B" results; of the four class "C" results, that is, poor results, two were cases of false labour; one was a mental case, and in the last the treatment was given too late in labour and no appreciable result was noticed.

I would like to briefly summarize two of our "A" results, to give you some idea of what results can be obtained from the use of this anaesthesia.

Case No. 1.—Age eighteen, para. 1. Admitted 2.15 p.m.— $2\frac{1}{2}$ F. dilated; very strong pains occurring every three minutes. Patient restless and shrieking. Hypodermic given on admission. Noticeably sedative effect. Instillation one hour later, 3.30 p.m., nearly 4 F. dilated. Patient tasted ether in two minutes, ether odor on breath in three minutes; asleep in eight minutes. Slept for two and a half hours; could not be aroused. Caput showing with pains at 5.45—delivery 6.20 p.m. No additional anaesthesia. Nine pound eight ounce baby, perfectly normal.

Case No. 2.—Age forty-two, para. 6. Admitted 7.20 a.m., active labour. Hypodermic at 9.00 p.m. 3 F. dilated. Instillation 9.30 a.m.—4 F. dilated. At this time pains every two minutes and patient making considerable noise. Although instillation partly expelled, effect very noticeable in ten minutes. Patient quiet and stuporous. Labor progressing rapidly. Delivery completed fifty minutes after instillation. During that fifty minutes patient would open eyes when spoken to, but needed no additional anaesthetic at actual time of delivery, and was not restless during any part of the labour.

Both these patients, twenty-four hours later, remembered nothing after they received the instillation.

Such results are, unfortunately, not obtainable in all cases, and it may be necessary to administer a few drops of ether by mouth as the head is sweeping over the perineum, and additional anaesthetic is practically always necessary when extensive repair work has to be done, or when the labour is terminated by operative measures. Such cases as these, where the benefits are quite marked, but additional anaesthetic at actual times of labour is necessary, are graded in our classification as "B" results.

But to be able to give to a woman in the throes of mental agony and physical pain, relief by a safe analgesia that will carry her from the later part of the first stage to the termination of her

labour free from pain and in a quiet slumber, is to my mind a godsend to her, to her relatives and even to her obstetrician, and is the greatest recommendation that can be given to this form of treatment.

Let me sum up the following conclusions:—

1.—This method is of a simple nature, easily given, and produces no deleterious effects in either mother or babe.

2.—It produces an analgesia throughout the greater part of the second stage in all cases,—in some even to the termination of labour.

3.—It can be used in private practice, but is more suited for hospital cases.

4.—It practically never tends to produce any nausea or vomiting, or intestinal irritation.

5.—In 80 per cent to 90 per cent. of patients the results obtained are satisfactory. However, in a few patients (about 3 per cent.) the effect is unpleasant due to the patient becoming irrational or violent.

REFERENCES

- (1) PIRIGOFF, *Recherches Protique et Physiologique sur l'etherisation*, 1847.
- (2) CUNNINGHAM AND LEAHY, *Boston Med. & Surg. J.*, 1905.
- (3) SUTTON, *Rectal Anesthesia*, (Gwathmey's Text-book on Anesthesia).
- (4) GWATHMAY, *Amer. J. of Gyn. & Obstetrics*, Aug., 1924.

CANCER OF THE LARYNX*

A Report of the Cases at the Toronto General Hospital, during the Past Five Years

A. A. CAMPBELL, M.D.

THAT cancer develops rather frequently in the healthy larynx is known by all close observers of large experience. Fortunately, only occasionally does it develop in the presence of other laryngeal diseases. Since little is known of the cause of this dread malady, and since hope of prevention resides in a knowledge of the cause, we are kept well within the domains of speculation.

This subject was not chosen with the idea of presenting anything new, but just to study the conditions as we find them in a large hospital, and to show why we should exercise greater care and urge upon our fellow practitioners and patients the necessity of early diagnosis, if treatment is to be of avail and disaster avoided. This study is limited to cases, thirty-one in number, which have been admitted to the Toronto General Hospital during the past five years. The histories have been gone over, and observations noted as follows:—

1.—Etiology.

(a) *Age*.—The youngest patient was thirty-six years of age, and the oldest, seventy-seven. Fifty-nine per cent. were between the ages of fifty and seventy, and the commonest decade

was from sixty to seventy.

(b) *Sex*.—Of the thirty-one cases twenty-six were males, and five females, that is, eighty-four per cent. male and only sixteen per cent. female.

(c) *Nationality*.—There were eleven Canadians, six English, three Scotch, one Welsh, and one Finnish. Nine were unrecorded.

(d) *Occupation*.—There were six clerks, four wood-workers, one each of salesman, attendant, caretaker, foreman, machinist, labourer, and nine unrecorded. The five women were engaged in house-work.

(e) *Family History*.—In two cases one parent had died of cancer, but in neither case was it cancer of the larynx.

2.—Symptoms.

(a) Hoarseness was present in every case and varied in duration from four weeks to fourteen years, the average being eight months, before diagnosis was established.

(b) Difficulty in swallowing was present in thirteen, or forty per cent. of the cases, even before the disease had spread to the pharynx.

(c) Pain, often referred to the ear on the same side, was present in two cases, and was a late symptom.

(d) Cough was an indefinite complaint, noted in eight cases, and was also a late symp-

*Read before the Section of Ophthalmology and Oto-Laryngology, Academy of Medicine, Toronto, Feb. 9, 1925.

tom, and present in all complicated by pneumonia.

(e) Frothy mucus in the pharynx was complained of in all late cases when growth had extended into the oesophagus or the pharynx.

3.—*Findings.*

(a) The growth involved the right side in thirteen cases, the left side in ten, both sides in four, and was unrecorded in four.

(b) Fixation was noted in all cases, involving the true cords or arytenoids.

(c) Enlarged, fixed, cervical glands were noted in eleven cases.

(d) Section and microscopic examinations were made in seventeen cases, and in every case epidermoid carcinoma was reported. In one case two sections were made, one from an enlarged arytenoid and the other from the ventricular band on the same side. The former was reported chronic inflammation, and the latter, carcinoma. In the one other case an early section was reported papilloma, while another section, taken a few months later, was carcinomatous.

Two patients, J. N. and E. R., had a positive Wassermann reaction, and were diagnosed syphilis, but, after anti-specific treatment had failed, were shown by section to be malignant.

One case, H. M., diagnosed tuberculous laryngitis and having a history of hoarseness for fourteen years, extensive disintegration of the larynx, definite fibrosis of the lungs, and positive test for tuberculosis, developed a new growth on the left side of the larynx, together with large cervical glands. Section, both from the larynx and the glands, proved to be carcinomatous.

One case, J. D., had a small, hard, ulcerating mass on the soft palate near the base of the uvula on the left side, also a new growth on the posterior two-thirds of the vocal cord on the opposite side. Both growths proved on section to be epidermoid carcinoma. This case is remarkable in that two primary cancerous areas, separate and distinct from each other, on opposite sides of the body, occurred in this patient. Death resulted within three years from the onset.

Treatment.—Unfortunately most of the patients appeared for treatment so late that only two cases were intrinsic, and therefore, considered suitable for operation. One case,

W. D., had a thyrotomy done, the growth, together with the cord from which it grew, was removed. Recovery was uneventful, but this man died suddenly of angina pectoris six months later. Another case, C. H., had a similar operation of thyrotomy, but there was a recurrence within six months, and death resulted from pneumonia two years later.

Of the other patients thirteen had tracheotomy done, and all were palliated by radium needles, deep x-ray, or both. Of the two methods the x-ray seemed to be more helpful, two cases being markedly benefited. One, J. M., who had a mass on the left cord with fixation, and glands in the neck, is still alive and comfortable with less fixation and hoarseness nine months after, and is still under treatment. A similar case, A. M., is also alive and comfortable with no apparent increase in the size of the growth or glands ten months later. As far as can be ascertained at the present time eighteen cases are known to be dead, three are still alive, while the other ten have been lost trace of. Of those who have died the duration of the disease varied from nine months to three years, the average being eighteen months.

Various complications were noted, pneumonia being the commonest and accounting for six deaths. Four cases had a breaking down of the cervical glands with abscess formation, and one of these had an external fistula into the anterior triangle of the neck. One case had three severe haemorrhages from the pharynx, and finally died of pneumonia.

In summing up several points of interest are noted:—

1.—Prolonged hoarseness in a man over forty should be viewed with great suspicion.

2.—Cancer of the larynx is five times as common in men as in women.

3.—Occupation does not seem to have any influence in causing the disease as only one patient in the series, a salesman, had used his voice excessively.

4.—Heredity does not appear to be a factor as only two cases had relatives die of the disease.

5.—A new growth in the larynx, with fixation of a cord, is strong evidence in favour of malignancy.

5.—Cancer may develop in a syphilitic or tuberculous larynx.

7.—Two primary cancerous growths may develop in the throat of one individual.

8.—Different degrees of malignancy are noted in different persons, being more marked in the younger.

9.—Radium, and deep x-ray have a definite inhibitory action, but no cures have resulted.

10.—Great stress should be placed on early diagnosis before the growth has become extrinsic.

11.—Early section and microscopic examination may be reported papilloma or chronic inflammation, while a later section proves to be carcinoma. The rather indefinite term of "pre-cancerous state" is applied to the former condition.

MATERNAL MORTALITY*

HELEN MACMURCHY, M.D.

Chief of Division of Child Welfare, Department of Health, Ottawa

THE preliminary Report on Vital Statistics for 1924, issued by the Dominion Bureau of Statistics of the Department of Trade and Commerce, Ottawa, on May 26, 1925, states that for the eight provinces which form the registration area for Canada, our maternal mortality was 939 or six per 1,000 living births. The Annual Report of the Provincial Bureau of Health for Quebec for the official year 1923-4 gives the maternal mortality as 326. This makes a total of 1,265, or about twenty-four every week. Twenty-four mothers every week in Canada in 1924 died in childbirth or shortly afterwards.

Inquiries have shown, on the other hand, that many general practitioners in Canada have attended 1,000 births or even 2,000 births or more, and have never lost a mother.

At the conference on Medical Services in Canada, arranged by the Canadian Medical Association, and held at Ottawa in December, 1924, a resolution was passed, asking the Department of Health of Canada to make a comprehensive inquiry into maternal mortality.

A letter asking for advice and help in this inquiry was addressed by the Deputy Minister, Dr. John A. Amyot, on May 25, 1925, to every legally qualified medical practitioner in Canada. Six hundred and fifteen replies to this letter have already been received.

Further information is necessary in regard to our maternal mortality, and it is respectfully submitted to you, Mr. President and members of the Canadian Medical Association, that this

inquiry is thus being made by and for the medical profession and that its success depends on you.

The provincial departments of health and provincial registrars-general have given their cordial co-operation, and a confidential form of enquiry has been prepared, based upon the official certificate for the registration of death.

If the information received from the provincial registrar-general in regard to the death of any woman from fourteen to fifty years of age between July 1, 1925, and June 30, 1926, seems to show that the death in question should possibly be included in this inquiry, a copy of this confidential form with an addressed and franked reply envelope, both enclosed in a sealed envelope, will be mailed to the doctor who signs the certificate of death.

The form looks rather long, but it takes only two minutes and ten seconds to fill it out, as all the questions except the last are to be answered by cancelling the printed word "Yes" or "No" or by inserting a figure. It is hoped that every member of the profession, if and when called upon to do so, will kindly fill out and return this form.

Every year since 1921 we have lost the lives of over 1,200 mothers in Canada from causes connected with childbirth. At least 1,000 of these lives can be saved, if the medical profession can secure the co-operation of the mothers themselves and the fathers, and can educate public opinion.

Filling out the confidential form is the first step, and "C'est le premier pas qui coûte."

*Read at the Annual Meeting of the Canadian Medical Association, Regina, June 26th, 1925.

Case Reports

INTRACRANIAL DERMOID CYST

JOHN M. McEACHERN, M.B., (Tor.)

*From the Departments of Pathology of the
University of Manitoba and the
Winnipeg General Hospital*

Among the innumerable developmental anomalies and defects which are perhaps the heritage of some of our inbred races, there are none so rare in medical annals as intracranial dermoids. The English literature is singularly lacking in case records of this unusual condition. Cushing reports only one case in all his vast experience in neurological surgery. Such defects may only be diagnosed at autopsy.

Case A. S.—A Galician farmer, thirty-three years of age, was admitted to the Winnipeg General Hospital on May 6, 1924. At that time he complained of dizziness, blurred vision, weakness and muscular twitching of the left arm and leg.

Two years before admission he noticed that his left arm was weaker than the right, and that he was unable to control the movements of his left leg perfectly. This inco-ordination was associated with a sudden flexion of the knee and elbow joints on weight bearing.

The muscular twitching of the left eyelid, arm and leg was aggravated by exposure to cold. There was no history of persistent headache or vomiting. Neurological examination disclosed a normal pupillary response, a lateral sustained nystagmus and an occasional fibrillary twitching of the left eyelid. There was an exaggerated left knee jerk and a doubtful plantar flexion. Romberg's test revealed a slight tendency to fall to the left. There was some inco-ordination of the movements of the left arm and left leg. Ophthalmoscopic examination showed a well advanced secondary optic atrophy on admission. The urine, blood, and cerebro-spinal fluid were normal. A clinical diagnosis of cerebellar tumour having been made, operation was performed, but beyond an increase in intracranial tension the findings were negative. Post operative dural defect provided an outlet for the in-

creased pressure and the man lingered on for a year with frequent tappings of the meningocele.

Post Mortem Examination.—At autopsy there was nothing of gross or microscopic interest in the chest or abdomen except a peculiar developmental defect of the right kidney which possessed two ureters. A circular gap was found in the floor of the posterior cranial fossa of the right side. Through this protruded a large soft spherical mass about the size of a grape fruit. This arose from outside the brain substance and pressed upon the cerebellum. There was a tremendous depression upon the inferior surface of the temporal lobe. The mass measured 11 x 7 x 5 cm., possessed a capsule, and on section the contents were found to be similar to those of a dermoid cyst, namely, a soft buttery mass containing many hairs, but no other organized structures. This substance contained no cholesterol. The point of attachment of the tumour to the dura was not demonstrated.

Discussion.—Dermoid cysts of the type described above are known as inclusion dermoids in order to distinguish them from similar tumours confined to the genital glands. Of the inclusion variety we may speak of the implantation dermoid and the congenital dermoid. The implantation dermoid is the result of forcible inclusion of ectodermal cells following trauma and is of minor importance. Congenital or sequestration dermoids occur chiefly in the mid-line and are the result of accidental inclusion of ectodermal cells in the course of development. Such tumours occur in the skull along the line of the tentorium cerebelli, the thyro-glossal duct or the tract from the pharynx to the pituitary body.

They may arise in one of three ways. Firstly, by elevation of the ectoderm and its consequent spread over an excess of mesoderm. This type is rare. Secondly, by depression of the ectoderm and its retention in a recess or sinus. Finally the ectoderm may be completely included, producing a cyst. Several authors mention the association of inclusion dermoids with other developmental anomalies along the course of Sutton's line of concrecence. This line begins

behind the occipital protuberance, descends the middle of the back to the coccyx where it turns forward along the perineum following the raphæ of the scrotum and penis in the male, then ascends the front of the abdomen and thorax to terminate at the middle of the margin of the lower lip.

Lannelongue in a series of thirty-one congenital tumours of the head and face found only one true intracranial dermoid. He believes that they are due to the persistence of a crani-

Not only are they both lined by epithelium but they also possess in common sebaceous glands, which account for their soft buttery contents. The chief differentiating points morphologically may be found in the site of origin and in the variation in the complexity of the contents. While the inclusion dermoid is filled with sebaceous material and hairs, the ovarian type tends to produce more highly specialized structures such as teeth, bone, muscle, or even the rudiments of an eye.

In the case described we are undoubtedly dealing with a congenital inclusion of the ectoderm in the region of the tentorium cerebelli. These aberrant epithelial cells have lain dormant for many years, just as do the adrenal rests which give rise to hypernephromata. Finally some unknown stimulus has aroused these latent sebaceous glands resulting in an intracranial tumour of remarkable size.

Conclusion.—A congenital inclusion dermoid of the cranium has been described. This anomaly was associated with a double ureter. I am much indebted to Professor William Boyd for permission to publish this case.

REFERENCES

- BOYD, WM., *Surgical Pathology*, 1925, p. 217.
 EWING, *Neoplastic Diseases*, 1923, p. 951. JACOBI, *Am. Jour. Dis. Child.*, 1923, xxv, 439. LANDELONGUE AND MENARD, *Affections Congénitales*, Paris, 1891. MACCALLUM, *Text-book of Pathology*, 1925. MCFARLAND, *Surgical Pathology*, 1925, 91. MENDEL AND VINGER, *Klin. Wechschr.*, 1923, ii, 1270.

SPONTANEOUS PNEUMOPERITONEUM

M. R. MACCHARLES, M.D., C.M., F.R.C.S. Edin.

Assistant Radiologist, Winnipeg General Hospital

Out-Patient Surgeon, Misericordia Hospital,
Winnipeg

The object of reporting the following cases is to call attention to a method by which the x-ray can sometimes give useful and almost certain diagnostic information in that ever alluring clinical entity, the "Acute Abdomen."

The method referred to is the radiographic demonstration of "spontaneous pneumoperitoneum," or free gas in the general peritoneal cavity. It was used as early as 1916 by an Italian army surgeon in cases of gunshot wounds of

INTERCRANIAL DERMOID CYST

The soft buttery mass may be seen pressing upon the lobe of the cerebellum.

pharyngeal prolongation of the primitive intestine which gives rise to the hypophysis cerebri.

Bostroem describes eighteen cases of intracranial dermoids all connected with the dura or pia mater. The dural types of tumour occur in the mid line and are often connected with the skin by an epithelial canal. This epithelial canal is frequently a prolongation of the cyst wall which blends with the dura mater and penetrates the bone. This in turn connects with a fibrous cord derived from the scalp. A remarkable clinical feature in some cases is the absence of hair over the site of the growth.

There is a striking similarity between these inclusion dermoids and those of ovarian origin.



the abdomen to help to ascertain whether or not the bowel was injured.

From the standpoint of the patient, the method involves at most a trip to the x-ray



FIGURE 1



FIGURE 2

room, and a comparatively short stay there. The radiologist's part is not difficult. In both instances here reported the patient was turned

on his left side, and allowed to remain in that position for two or three minutes. The exposure was then made with the patient in that position, the film along the anterior abdominal wall high enough to include the diaphragm, and the x-ray tube behind the patient's back. These patients usually are not able to hold their breath. As it is desirable to have the diaphragm outlined as clearly as possible, the more rapid the exposure the better. (Compare Figs. 2 and 3).

The clinician might find the method helpful in cases where he suspects perforation of a hollow viscus, such as acute perforation of gastric or duodenal ulcer, or perforation of the bowel



FIGURE 3

in typhoid. In severe injury to the abdomen the presence of gas may not only indicate rupture of a hollow viscus, but be sufficient to outline solid organs. If he employed this means of diagnosis in unusually obscure cases of "acute abdomen," he would occasionally be rewarded with useful information.

Case 1.—Mr. S., age forty-two. Complaint: Sudden severe abdominal pain; duration forty hours. Clinical diagnosis: Perforation of peptic ulcer with general peritonitis. Figure 1 shows free gas separating the right lobe of the liver from the diaphragm, and extending downwards into the right iliac fossa, and a fluid level indicating free fluid in the general peritoneal cavity.

Case 2.—Mr. P., age thirty-four. Complaint: Sudden severe abdominal pain; duration three hours; digestive disturbances for two weeks. An experienced surgeon diagnosed acute appendicitis, and advised a McBurney incision, but requested an x-ray before operation. Figure 2 shows free gas separating the right lobe of the liver from the diaphragm. The lateral border or the right kidney is well defined. The exposure time was three seconds. Figure 3 shows the diaphragm more clearly outlined. The exposure time was 3/10 seconds.

Both of these cases were operated on immediately, and an acute perforation of a duodenal ulcer was found on each occasion. In Case 2, gas was heard to escape when the peritoneum was incised.

It would seem that this method is worthy of more general use. It is offered as a contribution to the more exact pre-operative diagnosis of abdominal emergencies.

CASE OF INFECTED THROMBUS

Reported by J. M. VAUGHAN, M.D.

From the Medical Service of the Montreal General Hospital

W. S., male, age twenty-seven, was admitted to the Montreal General Hospital on April 22, 1925, complaining of general malaise and loss of weight, with vomiting and pain in the head; he also had a running right ear.

His personal history presented nothing of importance, and the family history was negative. The present illness began about three weeks ago, when he contracted a severe "head cold" with aching pains in the right temporal region. These subsided in a few days, but he continued to feel weak and generally unwell: he was constipated and for some days suffered from nausea and vomiting. His convalescence was very slow and unsatisfactory, and he was admitted to hospital for observation.

On admission he presented a rather wasted appearance, with an icteric tinge to the skin and conjunctivæ. The temperature was 104 (afternoon) and the pulse 112. The chest showed, on the right side, a diminished resonance in the lower axilla and infra-scapular re-

gion, with some crepitations. The heart was not enlarged: the sounds were indistinct, but a faint basal systolic murmur could be heard. The liver was palpable at the costal margin, with very slight tenderness. The right ear showed a chronic purulent otitis media, with slight tenderness under the right sterno-cleido-mastoid muscle, raising the suggestion of jugular thrombosis. The nervous system showed nothing of note, and the ocular fundi were normal.

At this time the blood showed little of note: the white cells were 13,200, the haemoglobin 82 per cent., the red cells 4,650,000, and a blood culture was negative. The Van den Burgh reaction was negative, and the urine was negative.

From now on the patient's temperature was remittent, rising to 103 in the afternoon, with a moderately rapid pulse. There were no special complaints, beyond the development of pains in the chest with some cough, but his general condition steadily grew worse. Signs of fluid in the chest appeared, and some of this fluid was withdrawn and examined: It showed non-pathogenic bacilli. The white cell count rose to 26,400, and later fell to 18,600. Well-marked pericardial friction appeared five days after admission, and persisted. The Widal reaction was twice found to be definitely positive, and while there was no enlargement of the spleen noted, nor any rose spots, and the stools were also steadily negative to pathogenic organisms, the possibility of typhoid was considered, and due precautions taken. The liver gradually enlarged, and became tender. In the chest crepitations appeared at both bases; the cough persisted, and there was a particularly foul expectoration.

The clinical diagnosis made shortly before the patient died on May 7th, was multiple abscess of the lung, plastic pericarditis, bilateral pleurisy and chronic otitis media. These were regarded as secondary to some primary focus. Subdiaphragmatic abscess was discussed as a possible source, but no positive sign was found. It was thought possible that either this or an infected thrombus of otitic origin was responsible. The urine was negative throughout the illness and the abdomen showed no suggestion of any localized infection.

A summary of the *post mortem* findings is as follows: Empyema of the right pleural cavity,

with extensive adhesions; multiple abscesses of the lung; pericarditis with slight effusion, and solitary abscess of the spleen. No examination of the head was permitted, but on opening the superior vena cava there was found a comparatively recent thrombus, of infectious origin (*Staphylococcus aureus*), adherent to the pos-

terior wall of the vessel, and extending upwards into the right jugular vein, beyond the limits of the incision. It also extended for a short distance into the right auricle. There seems to be no doubt therefore, that this had been the focus of sepsis, and in all probability it had arisen in connection with the infection of the right ear.

A Clinical and Experimental Investigation of Arsphenamin Poisoning.—Soma Weiss, New York, publishes an analysis of accidents due to arsphenamin and records an attempt to approach one phase of the clinical problem with the help of animal experiments. The purpose of this study was to ascertain whether arsphenamin in massive therapeutic doses produces changes comparable to those of acute yellow atrophy of the liver in man and, if such changes are not produced, whether any predisposing condition could be induced experimentally which, together with arsphenamin, produces acute yellow atrophy of the liver in animals. The results of these experiments indicate that repeated doses of arsphenamin, corresponding to massive therapeutic doses, produce small areas of necrosis, fatty infiltration, congestion with round cell infiltration, and occasionally cloudy swelling in the liver cells, with the evidence of fatty degeneration in the tubules of the kidneys in some cases. The poisons produced no changes in the spleen. This tissue injury was not increased or modified when arsphenamin was combined with mercuric salicylate, in amounts corresponding to therapeutic doses in man. When the doses of arsphenamin mentioned were administered to cats in which liver injury had been produced by chloroform, the liver regenerated at the same rate as that in the series of cats which received chloroform alone. Arsphenamin, therefore, does not appear to increase the injury produced by chloroform. The histologic changes and the behaviour of the poisoned animals do not correspond to those observed in acute yellow atrophy of the liver in man. The classification of the toxic reactions cannot be applied rigidly. Cases showing symptoms and signs characterized by skin reaction (dermatitis exfoliativa), and those with vasomotor reaction (edema), are relatively

frequent. Twenty-nine deaths, at least, are attributed to arsphenamin. In twenty-one cases of the twenty-nine, death followed the injection of arsphenamin within a few hours. The liver showed no pathologic changes in seventeen cases in which necropsy was held. It is important, however, to emphasize the fact that every case of the group showed severe chronic lesions in other organs. Acute yellow atrophy of the liver, so-called, followed the administration of arsphenamin in eight cases, but no predisposing factor was found on pathologic examination which explains the etiology of the disease. In additional cases, death was attributed clinically to arsphenamin, but the necropsy revealed some other cause. Toxicologic analyses were recorded in seventeen fatal cases following the administration of arsphenamin. It is concluded, on the basis of the study presented, that the majority of fatal accidents can be prevented by observing caution in individuals who show cardiovascular and renal disease, clinical evidence of status lymphaticus, or acute infectious disease (pneumonia). The fact that animals under the experimental condition described do not show acute yellow atrophy similar to that in man, and that in the fatal acute accidents in which repeated doses of arsphenamin had been given the liver did not show noticeable pathologic changes, suggests that therapeutic doses of arsphenamin do not produce noteworthy tissue damages in the liver. One cannot attribute acute yellow atrophy of the liver to a toxic effect of arsphenamin. However, as the relationship between the administration of arsphenamin and acute yellow atrophy is definite, the conclusion that arsphenamin plays an *indirect rôle* in causing acute yellow atrophy is inevitable. The fact that the same disease occurs in syphilis without arsphenamin suggests rather the second possibility.—*Jour Am. Med. Ass.*, Feb. 21, 1925.

Editorial

A CANADIAN'S IMPRESSIONS OF THE RECENT MEETING OF THE BRITISH MEDICAL ASSOCIATION IN THE CITY OF BATH

THE British Medical Association Meeting held recently in Bath, July 17th to 25th, the first since the Canadian and British Associations have been officially affiliated, has a special interest to Canadians and from the standpoint of a Canadian interested chiefly in internal medicine brings into prominence several facts.

The first is that the leaders of British medicine as represented at the annual meeting showed an almost uncanny ability to lay hold of, and to expose the true inwardness of the important subjects discussed and to do this in such a way that the wayfaring man might follow them.

There were three subjects on the medical agenda: "Rheumatoid Arthritis," which was opened by Sir Humphry Rolleston; "Hyperpiesis," by Lord Dawson of Penn, and Professor Starling; and "The Uses and Abuses of Endocrine Therapy," by Dr. Langdon Brown and Professor Swale Vincent.

It could scarcely be expected that at this day and date anything very new or very positive could be said on any one of these subjects, but at least the important points of each were emphasized and the cool winds of fact were allowed to blow away cobwebs which time and custom had allowed to collect upon them.

Three equally broad subjects were discussed in the surgical section; namely, "Carcinoma of the Stomach," "Acute Intestinal Obstruction," and "The Treatment of Fractures."

In the section for pathology the new work on cancer was described and discussed, Dr. Gye and Mr. Barnard giving the opening addresses under the title of "Filter Passing Viruses." We present on page 955 an excellent review of the statements made by these investigators. Valuable papers on neurology, therapeutics, otolaryngology, ophthal-

mology and orthopaedics were read in the special sections.

In the section on gynaecology and obstetrics, pelvic malignancy had a large place. The opening address in this section was read by Professor Watson, of Edinburgh, formerly of Toronto..

Special sections were also devoted to public medicine, medical sociology and diseases of children. The discussions in these several sections occupied the morning hours. A number of afternoon demonstrations were also given, one of which on the "Pathology of Cardiac Infection," by Dr. Carey Coombs and Dr. Hadfield, of Bristol, is worthy of more than passing mention. The subject was very completely covered and the technical excellence of the specimens was notable.

The second general impression refers to the attitude toward the meeting as a whole. The man who said that "the Englishman takes his pleasure seriously," might also have said that he takes his serious duties pleasurable, and certainly the programme committee of the Association did not plan to make Jack a dull boy, for they mixed play with his work and perhaps the Canadian Association might well follow their lead to a certain extent. The list of social events, teas, competitions, excursions, etc., offered almost an embarrassment of riches.

That brings us to the third impression, which is that the city of Bath was unique among the places where such a gathering might be held. With a location and a medical history unparalleled and an architectural character all its own, it had the good fortune to have a most public spirited and sympathetic Chief Magistrate in Alderman Cedric Chivers, who was ably assisted by an energetic local medical committee.

The official opening, at which delegates from practically all the British Dominions were received and welcomed, partook of the nature of a university convocation and was a dignified and imposing spectacle; and the civic reception by the Mayor and Mayoress at the Grand Pump Room, with the Roman Baths as part of the exhibit, offered a

spectacular scene with an historic background such as could not have taken place in any other city of the Empire.

The attendance at the meeting was in the neighbourhood of two thousand. From every angle, not least that of the unification of the English speaking profession, it was on all accounts a success.

A. H. GORDON.

PUERPERAL SEPSIS

THE proceedings of the British Congress of Obstetrics and Gynaecology which met in April last to discuss the problem of puerperal sepsis are of interest, and the importance of the theme will be understood when it is noted that 3,000 of the 700,000 women giving birth to children annually in the last ten years in Great Britain have died, while innumerable others have been permanently injured or invalidated.

Three comprehensive reports were presented from the North of England, the London District, and from Wales, dealing with reported cases of puerperal infection, the mortality from which was 5.42 per thousand in Wales as compared with 3.81 in England. Figures vary, as regulations regarding notification of puerperal sepsis are not properly observed; in some areas deaths reported exceeded the number of notifications. Of the severe infections covered by the report, approximately one-half occurred after normal labour though there was an unanimity of opinion that interference favoured infection, manual removal of the placenta being particularly dangerous. Intra-uterine manipulation undoubtedly led to blood infection, for the London report states that eighty per cent of the patients in whom the uterus was explored, subsequently died. In the severe infections haemolytic streptococci were obtained from the blood in the great majority of cases. The degree of fever was not important but the pulse rate was extremely important, the London report noting ninety-six per cent recoveries with a pulse rate under 110

and only seventeen per cent with a rate of 160. The presence or absence of rigors was not considered important, but insomnia, delirium, vomiting, diarrhoea and peritonitis were of serious import. The prognosis was grave when fever occurred during labour or within twenty-four hours of its termination.

Fitzgibbon and Bigger reported a series of cases from Dublin with an incidence of infection approximately 2.8 per cent. and a mortality of 1.1 per thousand. They emphasized the importance of streptococci, the danger of interference, and the devitalization of tissues occurring from impacted labour. These observers in examining swabs from the vagina found varieties of streptococci in sixty-eight per cent of fifty cases, but haemolytic streptococci were found only twice in the series of swabs, while the streptococcus pyogenes was never present.

Discussion of these reports was opened by Prof. Whitridge Williams of Baltimore, who laid great stress on the importance of manipulation favouring infection but disagreed as to the probability of endogenous infection from vaginal streptococci. He reported some 3,000 cases from the Baltimore clinic with only three deaths. One of these was due to haemolytic streptococci though this patient had not been examined vaginally in the clinic or outside. Of the febrile cases twenty-four per cent had had spontaneous labour without injury, without vaginal examination and without any manipulation. In many of the cases some form of external infection undoubtedly escaped recognition.

Prof. Blair Bell was impressed with the importance of coitus before labour as a frequent cause of an otherwise inexplicable infection. Col. Harrison had noted an increase in the incidence of gonorrhœal infection following demobilization, and Lady Barratt held the view that old gonorrhœal cases might be particularly susceptible to streptococcus infection. Prof. Eden was strongly for the necessity of bacterial examination while Victor Bonney alone, held that puerperal sepsis was largely autogenic.

The Chairman called attention to the importance of this difference of opinion

as the public were only too willing to over-estimate the attendant's responsibility and liability.

It is questionable whether there was much positive good accomplished by all this discussion, yet the resolution of the Congress passed unanimously, favouring the provision of accommodation for cases of puerperal infection in general hospitals, must in the long run afford the much desired opportunity for observation of these cases, and for clearing up much of what remains obscure in the bacteriology of the female genital tract during pregnancy and the puerperium.

H. M. LITTLE

SOME PROBLEMS OF THYROID DISEASE

A N interesting lecture was delivered recently by Dr. Robert McCarrison on some problems of thyroid disease, (*Brit. Med. Jour.*, June 10th, 1925), in which he emphasizes the importance of other factors besides the one of deficiency of iodine in inducing disease. He writes that if we assume that thyroxin is the gland's active principle, it may be said that the essential function of the thyroid gland is to produce this principle, to maintain a definite concentration of it in the tissues, and by its means to ensure a higher rate of metabolism in the system than would otherwise exist in its absence. The gland, however, has undoubtedly more to do than to control combustion processes. Its anabolic activities and its regulation of the growth and repair of the body tissues are no less important. It is undoubtedly essential to the normal metabolism of iodine; a matter about which very little is known at present. According to Kendall, "The function of iodine within the molecule is to increase the reactivity and sensitiveness of the functioning groups present, namely, carboxyl and imino; any other function of iodine is highly problematical." In the absence of the thyroid secretion iodine accumulates in the blood. On the other hand, iodine is essential to the functional activity of the thyroid gland.

There is reason to believe that besides

thyroxin the thyroid produces other physiologically active substances. Kendall has extracted one which has no effect on the metabolic rate, although it contains about one-half of the total iodine in the thyroid proteins; it is mainly concerned with the nutrition of the skin and its appendages. Besides these there may be others, exercising specific effects on certain organs and tissues, so that the composition of the thyroid secretion is a very complex problem.

The efficient operation of the thyroid gland is dependent not only on the adequate provision of the raw materials from which its hormone-containing secretion is elaborated, but on a balanced adjustment of ions in its fluids and membranes. The composition of the food is a matter of the greatest importance to the organ, since it is from the food that it derives, not only the iodine and other essential constituents of its secretion, but those mineral elements on which this balanced adjustment of ions in its fluid and membranes and in the cells and tissue plasma of the body generally depends. It is not enough that the composition of the food should be normal; conditions in the alimentary tract must be such as admit of the adequate absorption of all those elements and complexes which are necessary to the gland's normal operation. It is, therefore, at the threshold of absorption

in the intestine that we must first seek for sources of the thyroid gland's disorders.

The second great source of interference with the normal operations of the thyroid is disturbance at the threshold of the utilization of its products in the tissues. Evidence is beginning to accumulate which suggests that the action of these products may vary at different age periods in different individuals, and be profoundly influenced by the concentration of certain ions in the cell and tissue plasma. Dr. McCarrison refers to the fact that two photomicrographs of the thyroid gland from two subjects of "puberty goitre," the one from a case of unmistakable myxoedema, the other from a case of unmistakable Graves' disease, yet both presented histological appearances typical of primary Graves' disease. While it is always dangerous to reason from structure to function, yet judging by the histological features of these two specimens, both sections appear to be from glands in active secretion, although one was from a case of "hypothyroidism," and the other from a case of "hyperthyroidism." Dr. McCarrison asks whether the diversity in symptoms in these two cases might not have its origin in some condition outside the gland, and be due to biochemical differences in the cell and tissue plasma. He considers it important that these two thresholds should be considered; the threshold of absorption in the intestine and the threshold of utilization in the tissues; the medium of communication between the two being the tissue plasma.

He then went on to consider in detail the disturbances that may occur at the threshold of absorption. The gland may become deranged because of the inadequate ingestion of iodine or of tryptophane. Interest at the present centres chiefly round the former. There may be a deficiency of iodine in the soil, or in the water supply or in the food. Sophisticated foods, such as white flour and some other prepared cereals contain little or no iodine; cereals and vegetables grown on soil fertilized by artificial manures, not of marine origin, are also deficient in this element. Goitre is, at present, believed

to be due to this deficiency of iodine, whether it be common to all the inhabitants of certain localities, or peculiar to some individuals, no matter what their place of residence may be. Dr. McCarrison does not think its etiology is always as simple as this; nevertheless, the provision of additional iodine may, as a rule in such circumstances, prevent the occurrence of goitre, both in man and in animals. It does not, however, always appear to do so. In parts of New Zealand, where deficiency of iodine has been definitely traced to the soil and water supplies and to the food grown on this soil, it was found by Hercus and Baker that in one locality, Timaru, the prophylactic use of iodine for a period of six months was without influence in preventing the appearance of thyroid enlargement in previously non-goitrous schoolchildren. In another locality its use for a period of one year reduced the incidence of first attacks of goitre in children from fifty-five per cent. in those who did not receive iodine, to thirty-nine per cent. in those who did. The interesting fact in these observations is that thirty-nine per cent. of previously non-goitrous children developed thyroid swelling despite the use of iodine for a period as long as one year. It follows, therefore, that deficiency of iodine was not the cause of the thyroid swelling in these children, or there was a failure in the absorption of iodine from the intestine, or an imperfect utilization of iodine either by the thyroid itself or elsewhere in the body.

Another potent source of goitre is the confinement of animals in unhygienic surroundings which involve the ingestion with their food and drink of substances derived from their own alvine discharges. There is, indeed, no more potent source of hyperplastic goitre than this. Fish confined in dirty tanks, animals confined in dirty cages, goats tethered on the same plot of ground for many months; in all these instances goitre is prone to arise if the food be on the borderland of insufficiency as regards its iodine content. The important fact indicated is that an amount of iodine which may suffice to maintain the thyroid gland in health in

animals living under hygienic conditions, may not suffice to prevent goitre when these same animals are living under unhygienic conditions. Moreover, McClelland has found that bacterial agents or their products in the gastro-intestinal tract may interfere with the adequate absorption of iodine, and that bacteria are capable of removing iodine from organic media containing it. It may be, therefore, that the continual ingestion of certain forms of bacteria in polluted water, may lead to a definite loss of iodine in the food. Gaylord has also shown that in the case of fish confined in dirty tanks the incidence of goitre may be prevented by the addition of arsenic or of mercury perchloride to the water, as certainly as by the addition of iodine. I have also shown that goitre is preventable in like circumstances by scrupulous cleanliness. It would appear, therefore, that the biochemical products of certain intestinal bacteria may be absorbed into the system and cause such changes in the biochemistry of the blood and tissue plasma as to make thyroid hypertrophy and hyperplasia imperative; or they may cause atrophic and degenerative changes in the gland. In such cases, the provision of additional iodine in the food appears to be a potent means of counteracting this action.

A third way in which threshold disturbances of absorption may cause goitre is by lack of balance in the food. The excessive ingestion of proteins and of certain fats, or of both, may cause hyperplastic goitre in animals. This factor, however, is much more likely to arise if the animals be of a certain age and be living under unhygienic conditions; or if the diet be such as to favour constipation and intestinal putrefaction. It may here be mentioned that cod-liver oil appears to prevent thyroid hyperplasia in animals, no matter how unhygienic their conditions of life may be.

Lastly, the excessive ingestion of lime for prolonged periods may lead to the development of "colloid goitres" of small size in some animals. In all these cases the development of goitrous hypertrophy would appear to be preventable by supply-

ing additional iodine in the diet, provided that the iodine be adequately absorbed. It is to be borne in mind, however, that the adequate absorption of iodine is dependent on a healthy state of the gastro-intestinal tract.

It would appear, also, that disturbances in the thyroid secretion may arise from the possible influence of a concentration of certain ions in the cell and tissue plasma. If the thyroid gland be removed in lambs or kids two or three weeks old, nothing happens for eighteen days; after that, growth ceases. If, however, the animals be three or four months old, growth is but little affected, and the removal of the gland is evidenced chiefly in failure of the nutrition of the skin and in loss of intelligence. The gland's function thus appears to vary with the age of the animal. Now, if instead of removing the whole gland, the greater part of it be removed in guinea-pigs, leaving an amount sufficient to initiate compensatory hypertrophy in the remainder, it is found again that nothing much happens for fifteen or eighteen days, then hypertrophy and hyperplasia occurs in the remnant left, and this goes on until the deficiency caused by the thyroidectomy is made good. The organ then settles down to normal activity. It is to be noted that this thyroid hyperplasia occurs only after the lapse of a period of about eighteen days; that is, just when the normal growth and repair of the body begins to be imperilled. During this latent period changes have undoubtedly taken place in the tissue cells and plasma, which make hypertrophy and hyperplasia imperative.

This may be regarded as an example of how hypertrophy and hyperplasia may be caused by disturbances at the tissue threshold, namely, by the presence in the cell and tissue plasma of abnormal metabolites. It is generally believed that thyroid hyperplasia is due to lack of iodine, but in the above experiment, hyperplasia occurs in the remnant of the thyroid tissue, although this remnant has at its disposal all the iodine derived from the food, which sufficed previously to keep the whole gland in health.

According to Dr. McCarrison, this would indicate that thyroid hyperplasia may result from disturbances at the tissue threshold which are not always controllable by iodine. In this respect they are in marked contrast to those disturbances which result from interference with proper absorption. So far as his investigations permit him to form an opinion, he considers that iodine initiates and maintains the normal cycle of the thyroid gland's activities. It is, so to say, the oil of the thyroid engine, but I do not regard the efficient working of the thyroid mechanism as a matter solely of

lubrication, important though this may be.

It is, I believe, rare that any metabolic disorder, such as goitre, is due to a single cause. There is, as a rule, a multiplicity of factors involved; the thyroid gland cannot be considered apart from the rest of the body, nor iodine apart from other food constituents. The time has come when we must search more closely for causes of the thyroid gland's disorder in disturbances at the threshold of absorption in the intestine, at the threshold of utilization in the tissues, and in the cells and tissue plasma of the gland itself.

VIABILITY OF THE BACILLUS TYPHOSUS IN OYSTERS

DURING recent years there have been several outbreaks of typhoid fever which have been attributed to oyster-borne bacilli. As the result of these epidemics investigations have taken place on the viability of the *Bacillus typhosus* in sea water and the length of time this bacillus will remain viable under storage conditions. Stiles, *Bulletin 156*, U.S. Department of Agriculture, September 1912, reported the isolation of typhoid bacilli in two instances of seven and twenty-one days respectively after the removal of oysters from contaminated beds. Very recently the Bureau of Laboratories and Research of the Chicago Department of Health undertook experiments to determine the length of time required for the disappearance of typhoid bacilli from contaminated oysters under various conditions. After twenty-two days a test of the shell exteriors of the live oysters kept in an icebox was made. This examination disclosed that about

50,000 typhoid bacilli were present in 1 cc. of a pint of water used in washing the exterior of the shell. All oysters that were alive as shown by a tightly closed shell were trephined and careful aseptic tests made only on the interiors; bacilli were found in numbers up till the twenty-second day but not after that. The oysters by that time had soured.

The conclusions arrived at were that the longevity of the *Bacillus typhosus* in both shucked and shell oysters in storage varies with the temperature at which they are kept. The temperature best suited for the preservation of the oyster tends to prolong the life of the *Bacillus typhosus* in the oysters. There was no evidence of any bactericidal power or eliminative action against these bacilli observed in living shell oysters during dry storage at forty-five degrees Fahrenheit. The micro-organisms will survive for a longer period than the oyster.

ON GLACIER LASSITUDE*

IN a series of articles to be written by Dr. Leonard Hill and Dr. Argyll Campbell, of the National Institute for

Medical Research, some interesting physiological problems of the Mount Everest expedition are to be discussed. The first one, is that of "glacier lassitude" which Major Hingston, the medical officer of

**The Lancet*, May 2, 1925, p. 939.

the expedition, describes as follows: "A very distinct feature in the Mount Everest region is the pronounced glacier lassitude which develops over large tracts of ice. This was most marked on the Rongbuk glacier, especially when passing through a trough in the ice at an altitude of 20,000 feet. The trough itself was a remarkable feature, being girt on either side with walls of ice in many places rising into fantastic pinnacles and ornamented with pyramidal spires. In this trough members of the expedition were conscious of a peculiar sapping of energy, a weakness of the legs, and a disinclination to move. It was not a breathlessness due to exertion, but a definite loss of muscular power. One seemed to drag oneself along instead of going with the usual strength. The lassitude appeared immediately after stepping on to the glacier and was as quickly relieved on again reaching rock or morain. It was most noticeable in the absence of wind and in the middle of the day when the sun was strong. It was absent late in the evening and in the early morning. The cause of this lassitude is easily explained. The conditions requisite for its development are a sheet of ice, a hot sun and a still air. The lowest stratum of the atmosphere under these conditions becomes saturated with moisture but does not rise, owing to its chilling from contact with the ice. We did not notice that other atmospheric conditions had any special influence on these high altitude symptoms. Our experience in the Western Himalayas was to some extent explanatory. There on two occasions our party climbed the same peak to a height of 18,203 feet. During the first ascent the sky was clear, the air was free from moisture, and our disability was slight. On the second occasion the sky was dark, a storm seemed imminent, and the atmosphere felt heavy and damp. Our distress on this second occasion was acute. Every few paces found us gasping for breath. The same explanation applies to this as in the case of the glacier lassitude. The free evaporation of per-

spiration was checked, and as a consequence the high altitude symptoms were increased."

Major Hingston has shown by this account that a feeling of great lassitude is produced by overheating the body whilst at a high altitude. We know already that the ordinary discomfort due to overheating is accompanied by an increase in pulse rate. Unfortunately Major Hingston does not give the pulse rate of his comrades while suffering from this glacier lassitude. Drs. Leonard and Campbell write that most likely the combined effects of overheating and altitude caused the prostration by fatigue of the heart muscle, the heart having to pump blood to the skin for cooling as well as to the muscles for work. However, to determine this fact they made experiments on individuals placed in a laboratory room in which the conditions of the atmosphere at an altitude of 20,000 feet were imitated at a temperature of about twenty degrees Centigrade. The results of the experiments are thus summarized. "It may be concluded that glacier lassitude was due to the combined effects upon the heart, of overheating of the body, and of breathing oxygen at low tension; under such conditions the pulse rate becomes a good indicator of the distress of the heart. A pulse rate of 140 per minute must be considered the limit of safety in subjects under the conditions specified. The presence of moisture in the air does not interfere with the passage of oxygen through the lung epithelium, although it greatly influences the heart by the overheating of the body which takes place owing to the greatly reduced evaporation of fluid from its surface. The beneficial effects of breathing oxygen at high tension during exercise are considered to be due to the increased amount of oxygen in physical solution in the blood; a fact which under conditions of bodily stress they consider as probably of more importance than the degree of saturation with oxygen, of the haemoglobin.

Editorial Comments

THE "CAUSE" OF CANCER

The meeting of the British Medical Association at Bath, which was held there from July 17th to 25th, was notable for the large number of members who took part, for the lavish hospitality offered by the ancient city and for the announcement of the discovery by Dr. W. E. Gye and Mr. J. E. Barnard, F.R.S., of the two causal factors responsible for the growth of malignant tumours.

The announcement was made on July 22nd at the morning session of the section of pathology under the Chairmanship of Professor Ledingham, C.M.G., F.R.S., Chief Bacteriologist at the Lister Institute. The meeting took place in the Museum and the Literary and Scientific Institute which on that very hot morning was crowded to its utmost capacity. The title of the discussion was "Filter-passing Viruses."

The *Lancet* of July 18th contained two papers: "The aetiology of malignant new growths," by Dr. Gye, and, "The microscopical examination of filterable viruses associated with malignant new growths," by J. E. Barnard, F.R.S., of which the communications at Bath were a résumé. The two papers are in fact to some extent independent; the former dealing with the biology of the problem, the latter with its microscopy. The logical chain of evidence appears complete that "cancer" is the outcome of an infective, filterable, living virus operating in a tissue which has developed some sort of intrinsic specific receptivity. The physicist's part has been to devise an optical method of rendering visible this parasite which is invisible in the "ordinary" microscope, and also of photographing it.

The present research begins where Dr. Peyton Rous of the Rockefeller Foundation left off.

In 1911 Dr. Rous announced that he had been able to transfer a sarcoma of the fowl (Plymouth Rock) from chicken to chicken by all of the following procedures: Inoculating dead tumour cells, or tumour cells killed by drying or killed by 50 per cent. glycerol. Most important of all, Rous discovered that by inoculating a chicken with the cell-free filtrate (through a

Berkefeld filter) of an extract of tumour, the sarcoma in question would be produced.

Further, Rous and his co-workers showed in a series of papers published between 1911 and 1916 that the living infective agent which had passed through the pores of a Chamberland filter was killed or rendered inert by a temperature of 55°C. applied for fifteen minutes, and by treatment with chloroform, with toluene or with phenol. (0.5 per cent.).

The Rous tumour itself retains its infectivity even when immersed in glycerol.

The problem at the conclusion of Rous's work was to determine the nature of the filterable "agent" which Rous would not call a "virus" because he had not succeeded in cultivating it outside the body.

Dr. Gye as the result of his investigations believes the agent or "cause" of cancer to be an intra-cellular parasite, but a parasite so minute that it belongs to an order of dimension which is quite unfamiliar to all "ordinary" microscopists.

Mr. Barnard gives us some idea of the extreme minuteness of this latest identified organism or "virus", if "organism" connotes too much. The micron (μ) is one thousandth 0.001 of a millimetre. The diameter of a human erythrocyte is seven microns (0.007 mm.), that of a small microcoecus is one micron (0.001 mm.); the magnitude of a single cancer germ is 0.075 of a micron (0.000,075 mm.), or 100,000 times as small as a human red blood corpuscle.

It will be most convenient to summarize Dr. Gye's conclusions.

1. He believes that all malignant neoplasms contain an intracellular virus which can be extracted by a solution, e.g., Ringer's and made to pass through a Berkefeld filter.

This applies both to sarcomas and carcinomas of fowls, mice, rats, dogs and men.

2. The virus has been cultivated in vitro.

3. The virus *washed free* from all adherent material, when injected into a living animal does not produce a tumour, it does not even produce a visible lesion.

4. When an extract of the tumour made virus-

free and therefore non-infective is injected into an animal at the same time as the virus itself is injected, a cancerous growth develops.

This second factor Dr. Gye calls the "specific factor"; and he believes it destroys the natural resistance of the body-cells to the inroads of the virus. He thinks it to be of a chemical nature.

5. The specific or chemical factor injected by itself produces no tumour.

6. There is no species-specificity in the case of the virus, for the virus of one species will produce a tumour in any other species but—

7. The specific (chemical) factor shows the strictest species-specificity and even tissue-specificity.

Thus a cancer in a mouse can be produced by the virus from any species, e.g., fowl, but only when the second or chemical factor derived from mouse-tumour has also been injected. We note, then, the non-specificity as regards species of the cancer virus. It would appear that the virus is omnipresent and equally responsible for all the forms of cancer (sarcoma and carcinoma). Why we do not all get cancer all the time is because the second (chemical) factor is not only not present all the time, but is highly specific when it is present. In all probability each tissue has its own chemical factor.

Dr. Gye uses the term "primary culture" to mean the placing of a fragment of the fowl or other sarcoma in a tube of culture-medium (broth), the infectivity of which the addition of rabbit-serum is found to increase. It has also been discovered that the infectivity is increased or prolonged by keeping the culture under anaerobic conditions. Oxygen is inimical to the virus; a very interesting point. As might be expected, the infectivity varies directly with the size of the tumour taken; and as the upper layers of the supernatant fluid are the most infective, it would seem probable that something diffuses out of the tumour and invades the upper layers.

Perhaps the most important portion of Dr. Gye's work has been the cultivation of the virus *in vitro*. He found that by prolonged centrifugation of the clear fluid above a primary culture, the virus could practically all be thrown down, for the injection of some of the supernatant fluid produced a very small tumour, whereas, injection of the deposit gave rise to a large neoplasm. The medium most useful for cultivation *in vitro* contains rabbit-serum and

potassium chloride to which a fragment of a 12- to 16-day-old chick embryo has been added. The first "sub-culture" is a tube of the medium just described to which a loopful of "primary culture" has been added. This tube is incubated anaerobically at 36°C. for four days. The second sub-culture is established by a similar procedure; the dilution with each sub-culture is at least a thousand times. In the fifth sub-culture the original inoculum has been diluted 10^{15th} time. If tumours are produced with sub-cultures beyond the fifth, we may be certain that growth of the virus has taken place.

Such tumours are so produced, and therefore we conclude that growth *in vitro* has certainly occurred.

The main experimental facts may now be summarized:—

1. Any virus obtained from any neoplasm injected by itself into any kind of animal has no effect.

2. Any "specific substance" from any neoplasm injected into any kind of animal has no effect; whereas,

3. The virus of mouse-carcinoma along with the specific substance from fowl-sarcoma injected into a fowl will give rise to sarcoma, but into mice will have no effect.

4. Human carcinoma virus along with the specific substance from fowl-sarcoma injected into fowls will give sarcoma, but into mice nothing.

Thus while the "germ theory" of cancer is established, it is highly important to know that even the living virus by itself will not infect: there must be the specific receptivity or concomitant internal factor. Dr. Gye rightly regards this second factor—the chemical, specific one—as of immense importance.

He and Dr. Cramer showed some years ago that the bacteria, for instance, of gas-gangrene, or of tetanus by themselves are not infective; it required some chemical substance such as colloidal silicic acid to produce that lowering of the resistance which permitted of a lethal result. This lowering of resistance these authors have called "defence-rupture" or "kataphylaxis." Such tissue resistance or physiological insusceptibility to an extrinsic agent, Fraser Harris in 1908* had cited as one of the examples of "protoplasmic or functional inertia."

*The Functional Inertia of Living Matter, Churchill, 1908.

Dr. Gye has for the first time in regard to cancer actually proceeded from the vague to the concrete to the extent of isolating the chemical factor responsible for the rupture in the defences which permits of the virus beginning its work. It should be stated that a few months ago, Dr. Coley of New York, in reviewing the evidence for the parasitic origin of cancer, definitely suggested that in order to attack the tissues and induce them to produce a malignant growth some kataphylactic factor as postulated by Cramer and Gye was required.

Mr. Barnard in his paper on "The microscopical examination of filterable viruses associated with malignant new growths", begins by reminding us that late in the nineteenth century it was recognized that the theoretical limits of resolution of details by the microscope had been approached in actual practice.

The visibility and discreteness of the parts of a minute object depend on the intensity of the illumination and on the resolving power of the objective quite as much as on the magnification. There are only two methods of illuminating an object: One to transmit the light through the object which must not, therefore, be perfectly transparent, and the other to cause the light to fall upon the object which may reflect it, diffract it or scatter it. In the latter case the ground or field must be dark. Objects or elements of structure that are less than 0.25μ (0.00025 mm.) in diameter cannot be resolved into visible parts by any microscopical apparatus in present use.

Any new apparatus which can "resolve" objects of less than this diameter may be called an "ultra-microscope". It is an instrument of this sort which Mr. Barnard has devised. He writes, "By the use of ultra-violet light it is possible to obtain a real image of a small body provided a short enough wave-length is used." The source of light is a quartz-mercury-vapour lamp of the non-vacuum type; the observer must work in a semi-darkened room because his eye must be dark-adapted. Mr. Barnard uses light of $257 \mu\mu$; and an objective made of quartz. The magnifications employed are 1850 and 2200 diameters. The paper in the *Lancet* of July 18th has photomicrographs of the virus as seen both with transmitted light and in dark-ground illumination.

One of the most important sections of Mr. Barnard's communication is that dealing with

the artificial cultivation *in vitro* of the filter-passing cancer virus and of other similar viruses. His method was to allow serum-agar to flow over rectangular glass slips in a test-tube and to inoculate these with the filtered virus. After incubation, the film was covered with a glass or quartz cover-slip which permitted of cedar wood oil being used with the immersion lens. Fluid cultures from malignant growths are known always to remain clear; grown on solid media they are so minute as to be observable only by high power lenses. The colonies which are quite invisible to the naked eye, can be viewed by dark-ground illumination or photographed by light of very short wave-length.

Mr. Barnard believing, however, that ultra-violet light is destructive of the virus, is compelled to use as short exposure as possible. We are now assured that several other diseases are probably due to filter-passers. Barnard has already photographed the virus of bovine pleuro-pneumonia; and at the same meeting as that at which he and Dr. Gye spoke, Dr. Mervyn Gordon read a paper on the virus of smallpox as a filter-pass. Besides the poison of typhus, that of the distemper of dogs and that of encephalitis lethargica are now believed to belong to this group; influenza too is probably of the same character.

Dr. Gye's own name is William Ewart Bullock: he changed it to Gye on his marriage with a lady of that name (the G is soft). He was born in Derbyshire about forty years ago. "Billy" Bullock, the son of a railway signalman, was himself for a short time a railway porter. After studying at University College, Nottingham, and taking the degree B.Sc. of London, Gye went to Edinburgh to graduate in medicine. He obtained his M.D. as well as two gold medals during his course. Dr. Gye served in France and in Italy during the Great War. It is said that it was the fact that his mother died of cancer which turned his thoughts towards the problem of the origin of malignant growths. His success in the solution of that problem is a gratifying vindication of the national usefulness of the state-aided Medical Research Council.

Mr. Barnard is an older man and not a graduate in medicine. He is a F.R.S. and probably the most expert microscopist in Europe. He is Lecturer in Microscopy at King's College, London, and Director of the Department of Applied Optics, at the Institute for Medical Re-

search, Hampstead. As a child he was given a toy microscope by his father, and this so aroused his interest in the life of the invisible that he occupied all his leisure in studying microscopy and microphotography; to what purpose we all now know. A few days ago Dr. Gye and Mr. Barnard were received by H. M. the King at Buckingham Palace.

D. FRASER HARRIS

London, August 1st.

CANCER IN CANADA

There are few problems of the day which are receiving more concentrated attention than that of the causation and control of cancer; there certainly is no one factor which is a more serious menace to the health of the people. Therefore, the warnings which we are given by statistical studies of the question must not be allowed to fall on unheeding ears. One such study has recently been made by Fred. L. Hoffman, L.L.D.,* and apart from its intrinsic excellence, there is an added interest in the fact that the analysis applies to Canada alone. The value of the study is heightened, as Dr. Hoffman indicates, by the fact that there has been in Canada great improvement in late years in the methods of registration, classification, and analysis of vital statistics.

His observations deal with sixteen Canadian cities, which in 1921 had a combined census population of 2,200,000, and the returns for these cities are limited to the last fifteen years. By way of introduction, however, he shows that in twenty years up to 1924, the deaths from cancer had increased in the first decade at the rate of 14.5 per 100,000, whilst in the last decade the increase was 20.4. The average total mortality for the first decade was 60.1, and for the second decade it was 80.1. He had previously shown that the annual increase in the cancer death-rate of the United States was about two and a half per cent., corresponding quite closely to the 3.1 annual increase shown by the Province of Ontario.

Such figures, however, must be analyzed as regards the various organs and parts of the body affected, and also the different types of the disease. The Province of Ontario provides statistics which make this further analysis possible, and some interesting facts are brought out.

**The Public Health Journal*, Toronto, June, 1925.
No. 6.

Cancer of the buccal cavity, for example, the mortality from which in 1914 prevailed at the rate of 4.1 per 100,000, was 4.4 in 1923, an increase of no great significance. Cancer of the breast, however, shows an increase from 4.5 in 1914 to 9.2 in 1923; of the female generative organs, an increase from 5.2 in 1914 to 9.4 in 1923. There is a particularly suggestive increase in the mortality from cancer of the stomach, which has increased, though with intervening fluctuations, from 22.8 in 1914 to 31.0 in 1923.

Dr. Hoffman decides therefore that a marked increase has taken place during the period under observation. "It lies outside the realm of reasonable proportion that this particular increase, as indicated by statistics, should not be in approximate formity to the actual facts of the situation. The increase conforms in a general way to the data elsewhere dealt with for both the United States and Canada."

The number of cancer death annually for the whole of Canada has been conclusively established as about 6,000. The best measure available at the moment of the "cancer trend" in Canada, is a consolidated return of certain Canadian cities, beginning with ten cities in 1910 and reaching sixteen in 1923, diminishing to fourteen in 1924. The ominous rise in the death rate as shown by these figures is best appreciated from the tables given in Dr. Hoffman's paper, but the total increase is impressive enough. The rate in 1911 was 58.6; in 1924 it was 98.1 per 100,000, and "for all practical purposes this rate corresponds to the combined cancer death-rate of the United States."

Only a few points brought out in the analysis of these figures can be given here. In the first five years of the period only one city had a rate of over 100, (Halifax, 100.9). In the second five year period three cities showed a rate in excess of 100, namely, Halifax, Vancouver, and Victoria, and in the third five year period there were added to these cities in this class, St. John, Hamilton and Toronto.

Montreal, Ottawa, and Quebec, show relatively low rates in a period in which other cities show large increases, and Dr. Hoffman believes that the French Canadian population are less liable to cancer than the population of British origin, a point which he feels strongly to be in need of investigation. He holds also that the Indian population is unquestionably less liable to can-

cer than the white population. Cancer of the breast for example is very rarely met with amongst the Indians. His conclusions in this respect are based on extended investigations and personal interviews in North, Central and South America, and extensive correspondence with reservation physicians, brought down to the end of 1924. So striking a contrast in the occurrence of cancer in the Indian race is worthy of the closest possible scrutiny, especially as regards diet, for evidence is rapidly accumulating to show how closely associated is the occurrence of cancer with heavy meat eating.

In its last analysis, Dr. Hoffman concludes, "the problem lies in the hands of the general practitioner. He is first consulted by the cancer patient, and . . . the principal cause of cancer mortality is delay on the part of the patient to seek qualified treatment."

The mortality from cancer is evidence that no cure has yet been discovered, but it is due to the medical profession, as Dr. Hoffman admits, that attention should be drawn to the successful forms of control devised by surgery but for which the cancer death toll would reach far greater proportions.

H. E. MACDERMOT

THE LAST HUNDRED DAYS OF THE GREAT WAR

Many times since the armistice of November 11, 1918, and particularly during the months in which the troops were returning from their "high emprise" to their homes in Canada, the writer has heard the hope expressed by returning officers, and not of the medical service only, that steps would be taken to preserve, while the memories of active service were fresh and keen, the almost limitless experiences of modern war, in all its forms and phases, acquired by men but few of whom were bred to arms, and acquired at a cost even yet not fully calculated.

Such men, patriots at heart and in practice, were all aware both of the unpreparedness of Canada and the Empire generally for the dreadful ordeal when it began and of the cost in life and treasure of overcoming this handicap during the first half of the long struggle. They were naturally, therefore, anxious that the priceless lessons of experience should not die by mere lapse of time, the most subtle and valuable of them in the very process of re-establishment in

civil life, and all of them, even the most obvious, with the passing off the stage of life of the participants in the great stand of the English-speaking world for freedom.

They knew too how very much Canadian troops in all branches of the service owed to the framework of training and experience not of our own militia only in pre-war years, but, of the armies of the Motherland, by whose example we trained ourselves into war formations fit at last to crush, at least in a military sense, the formidable Prussian.

They, therefore, wished that a serious effort should be made to set down in permanent form for future use part at least of the lessons learned, and of the successful application of old principles to new circumstances, in all sorts of terrain and in all climates, from Siberia to tropical Africa and the islands of the Pacific.

While this task is now nearly done in the *Official History of the Great War*, issued by H.M.'s Stationery Office, in which Canadian effort and success have due place in the accounts of Imperial effort as a whole, there is a large field for the unofficial historian, in the recording of the experiences of individual units and services. This literature has grown to very large proportions, and is, of course, of quite varying merit and value, from the more formal war diary type of record, to the very personal regimental and corps histories, with their special appeal to the comrades who served in the individual units.

It should be a matter of satisfaction to all who served in the Canadian Expeditionary Force, but particularly in the Medical Service, that the work of the C.A.M.C. in that last hundred days has been so carefully, modestly and understandingly set forth by an officer who had served during the whole war, and who, for the greater part of the period in question was himself, as D.D.M.S. of the Canadian Corps, *par maxima* of the events he described.

The value of his* book as a text-book for future classes of medical officers is at once apparent, though the only phase of the duties of a medical service taken up is that of an army in pursuit. Administration and arrangements of the service with an army in retreat, or for acci-

*The C.A.M.C. with the Canadian Corps during the Last Hundred Days of the Great War. By Colonel A. E. Snel, C.M.G., D.S.O. The King's Printer, Ottawa. \$1.50, postage extra, and from booksellers.

dental combat, or for prearranged battle, or for a war of fixed position, are not considered, as only in the last hundred days was there any experience of the open warfare so prevalent in all previous wars. The long drawn out struggle with a narrow no-man's-land between the trenches was now over, and must have historians of its own as a phase of the Great War.

This historian has given us an account most variously reminiscent. In parts it smacks of the official war diary; again, it changes to personal statements of opinion on various administrative points, such as the proper control of field ambulance work shop or motor ambulance convoy; now and again discussions occur upon changing methods, perhaps in the proper keeping-up of the all-important admission or discharge book of the field ambulance, which once at least was done at the casualty clearing station by details of the clerical sections of the field ambulances clearing to them; perhaps in the use made of the sanitary sections; perhaps in the duty assigned for the time being in the evacuation of wounded to the divisional transport, to the motor ambulance convoys, to the light railway, or even to the broad gauge steam railway, before the casualty clearing stations were reached. A very interesting statement is made of the relations of the medical service with the "G" and "Q" branches, and liaison generally with divisional and corps headquarters. These discussions all show clear internal evi-

dence of opinions born of experience, expressed without undue dogmatism. Indeed, all through the book there runs the golden thread of mutual confidence, good-will, and respect, both within the medical service, and in its relations with all the other services, without which the record of the Canadian Corps would have been impossible of attainment.

There is modestly implied, too, the courage in all ranks and in all services, which usually goes with reticence. One is reminded of the comment made by Malleson in the preface of his *History of the Indian Mutiny of 1857*:—“There has never been an event in history to which the principle of the Order of the Day, published by Napoleon on the morrow of Austerlitz, applies more thoroughly than to the Mutiny of 1857. ‘It will be enough for one of you to say,’ said the Emperor in his famous bulletin, ‘I was at the Battle of Austerlitz,’ for all your fellow citizens to exclaim, ‘There is a brave man!’ Substitute the words ‘Indian Mutiny’ for ‘the Battle of Austerlitz’ and the phrase applies to that band of heroes whose constancy, whose courage, and whose devotion saved India in 1857.”

With due allowance for Napoleon’s natural flamboyancy, a little alien to the temper of the Empire nowadays, may we not, *mutatis mutandis*, say the same of the armies that faced the Germans for those four memorable years, and won the war at last? J. T. FOTHERINGHAM

Significance of Hemoptysis Onset In Tuberculosis.—Two hundred and forty-five, or 8 per cent., of the total number of patients admitted to the Trudeau Sanatorium during a period of twelve years gave a history of hemoptysis onset, as reported by F. B. Trudeau, Saranac Lake, N. Y. The sputum was positive in 119, or 48.57 per cent., of these cases, while tubercule bacilli had been found in the sputum of thirty more patients reported, before they entered the institution. Counting in these thirty cases, 149, or 60.81 per cent., of the 245 cases had positive sputum. In 171, or 69.83 per cent., of this series of hemoptysis onset cases, a confirmatory diagnosis was made in the roentgen-ray laboratory. Râles usually moderately coarse in character, situated in the upper half of either chest, and not clearing after cough, were present in 196, or 80 per

cent., of the cases of this series. Ten, or 4.08 per cent., had had at some time a pleurisy with effusion which could not be explained by any cause other than tuberculosis. In following these 245 patients from one to twelve years after leaving the sanatorium and classifying them under the headings of “well,” meaning well and working for at least two years, “living” meaning either that they are still continuing their treatment or else that nothing more is known about them other than the fact that they are still living, “dead,” and “unknown,” it was learned that 114 are well; sixty-three are living; forty-seven are dead, and twenty-one were not heard from. The prognosis in this type of case is no better or worse than in any other mode of onset of this disease.—*Jour. Am. Med. Ass.*, June 13, 1925.

Abstracts from Current Literature

MEDICINE

Paroxysmal Tachycardia in an Infant. O'Flynn, J., *Brit. M. J.*, Mar. 14, 1925.

This case is reported (1) on account of the very early age of the patient; (2) in illustration of the extreme degree of distress which a young child's heart will stand. The patient was a female child of eight months, had had a normal birth and apparently was perfectly well up to the time of the illness; she had been examined at the local clinic at the age of six months. She was still on the breast and the mother was perfectly well.

When Dr. O'Flynn was called in the child seemed to be suffering from intestinal irritation and toxæmia, with restlessness, the passage of green stools, and convulsive attacks. The heart, however, was beating very forcibly and the rate was uncountable. The intestinal condition improved under treatment, but the heart did not slow down at all. Digitalin was given, 1/100 gr. hypodermically every four hours, and kept up for some days, but with no effect on the heart rate. Doses of atropine sulphate (1/100 gr.) were also given but were equally ineffectual. The liver became enlarged, and the heart dullness increased. Cheyne-Stokes breathing developed and there were signs of bronchitis at both bases. On the eighth day there were signs of improvement in the general condition, although the heart still showed delirium. On that afternoon, however, there was very marked improvement and the heart returned to its normal rate; a large amount of urine was passed, and the liver was of its normal size.

There was a second similar attack a few months later, which lasted for twenty-four hours. The heart had been carefully examined in the interval and was found to be quite normal. With great difficulty an electrocardiographic tracing was taken a little later on, and the record was found to be normal in all respects.

H. E. MACDERMOT

Tuberculous Meningitis in Children. A statistical study of the disease from birth to fifteen years of age. Herben, B. S., and Asserson, M. A., *The Amer. Rev. of Tuberc.*, May, 1925.

It is pointed out that in spite of a long series of observations on this subject it still presents certain unsolved problems, such for example, as the part played by direct contact of young children with cases of active tuberculosis. By some authorities this is regarded as an important factor in most cases, but hospital records show a very large number of cases in which it is stated "no history of contact obtained." The possibility of infection through milk, the influence of housing, and racial susceptibility, are all factors to be considered and analyzed.

With these points in mind a study was made of 135 cases of tuberculous meningitis in children, from birth to fifteen; the homes and relatives were visited and 210 tenement houses were examined. The death records of 435 cases in the Borough of Manhattan were also investigated. As regards the mode of infection, it became evident that the histories given in hospital records and by physicians could have been elaborated. In this series of 135 cases the histories from these sources showed that there was contact in 19 per cent. and none in 81 per cent. Later investigation in the same cases showed a definite history of contact in 56 per cent., probable contact in 18 per cent., a suspicious history of contact in 10 per cent., and no history of contact in 16 per cent.

Both from recorded experiences and from the data in connection with this series, the authors conclude that where the milk is pasteurized, as in New York City, the milk supply is a negligible source of infection for this disease. They believe that contact with active tuberculosis in human beings is the chief source. The infection is most prevalent in the most congested and least sanitary districts, and tenement houses present a formidable aspect among the etiological factors. Instances are adduced to show the urgent need of disinfection of houses which have been occupied by tuberculous tenants.

The influence of previous diseases such as otitis media, measles, pneumonia and whooping cough is apparently considerable. In this series 58.7 per cent. gave a history of such previous illnesses. In 8.9 per cent. there had been a preceding tonsillectomy, in connection with

which point reference is made to the findings of Mitchell of Edinburgh, who claimed (1917) to have found 100 children and six adults with primary tuberculosis of the upper cervical lymph nodes.

The highest mortality occurred in young children, the greatest number of cases in a single age period developing at from one to two years of age. The duration of illness in the series averaged eighteen days; there were no recoveries. Harbitz is quoted as saying that up to 1921 there had been a total of forty cured cases, but these were among older children and adults.

H. E. MACDERMOT

Studies on the Calcium Content of Blood of Normal and Tuberculous Subjects. Matz, P. B., *The Amer. Rev. of Tuberc.*, May, 1925.

The calcium content of normal human blood has been found by most observers to be 10.0 mgms. per 100 cc. Before beginning the present study a series of confirmatory estimations on the point were made in fifty healthy subjects. The values were found to vary between 9 and 12 mgm. with an average of 10.28 mgm.

Observations were then made on the calcium content in various stages of pulmonary tuberculosis, since there are conflicting views on the matter. It was found that the greatest amount of calcium was present in apparently arrested cases of chronic pulmonary phthisis, as was to be expected with the maximum degree of calcification. The lowest concentration was 9.22, which is within normal limits, but on the whole there was little variation in the findings in the different stages of the disease. It was noted that the same concentration obtained whether the case showed hemorrhage or not.

The next step was to study the absorption and utilization of calcium of the food in the normal person, since the views of the various workers in this field are somewhat at variance with each other. Dr. Matz found that increase in the concentration of calcium in the blood depended on the quantity of the calcium in the food, there being an appreciable increase when a greater quantity of this was given. In tuberculous subjects also the calcium content rose when the diet contained more of the mineral. The rise following the use of calcium chloride was greater and extended over a longer period than after the ingestion of calcium lactate. The addition of

codliver oil definitely aided in making the rise still greater.

Study of the coagulation time in normal and tuberculous subjects revealed no variation between the two. As a general rule the coagulation time shortened in accordance with a greater degree of calcium concentration. The coagulation time decreased under the administration of calcium salts.

H. E. MACDERMOT

Psychic Manifestations in Cases of Brain Tumours. Moersch, F. P., *Amer. Jour Psychiatry*, April, 1925.

Two hundred and thirty-nine cases of brain tumour are reviewed, in which fairly accurate records of the mental status were kept. While practically all of these patients at some time or another showed mental changes, seventy-three of them showed marked mental changes during some stage of the disease. In most of these the psychic changes were purely generalized, such as listlessness, indifference, anxiety, mental and physical let-down, dulness, mild apathy or late stupor.

The 239 cases were grouped anatomically to ascertain if possible, whether tumours in a certain location might present definite psychic manifestations. It was found that in all cases of bilateral frontal lobe tumours (corpus callosum) there were marked mental changes. The author reminds us that Foster Kennedy has said that a tumour of the corpus callosum can only be diagnosed *post mortem*. By grouping together the mental reactions in these cases of corpus callosum tumours, one obtains a syndrome characterized by progressive mental let-down, forgetfulness, confusion of thought, affective disturbances, lack of comprehension, and motor phenomena of an apractic nature. Beyond this, no localizing value can be attached to mental phenomena in brain tumours.

An observation of great importance is that psychoneurotic manifestations, especially neurasthenic states, as the precursors of more marked mental phenomena, are not uncommon. Only too often a case is labelled neurasthenia when more careful observation might have revealed brain tumour. The author also notes that confusional states of various types, anxiety reaction, hallucinations, vague unsystematized delusional trends and dementia praecox reactions are frequently observed, and in the absence of focal

neurologic signs, present marked difficulties of interpretation.

A very interesting table presents the first diagnosis made in a group of thirty-nine brain tumours. The group of ten frontal lobe tumour cases gives an idea of the variations in early diagnosis. The various diagnoses made were mental state, arterio-sclerotic dementia, general paralysis, compensation neurosis, mental state (marked), psychoneurosis, orbital tumour, brain tumour (location?), epilepsy, syphilis.

The group of seven cases of tumour of corpus callosum were at first diagnosed as follows:—Presenile psychosis, syphilis, epilepsy, "losing his mind," paresis, tumour of the skull, encephalitis.

Every page of this article reminds us of the necessity of bearing in mind the possibility of brain tumour in cases presenting psychoneurotic or psychotic symptoms and of making use of all diagnostic aids in excluding or locating it.

A. G. MORPHY

The Significance of Urobilogen in the Urine As a Test For Liver Functions. Wallace, George B. and Diamond, Joseph S., *Arch. of Int. Med.*, June, 1925.

The authors begin their article with the statement that in any disease of the liver, it is unlikely that all functions are deranged, or at least equally involved, and furthermore, there is no known single test which measures liver functions as a whole. It would appear from the literature, that all workers are generally agreed as to the enterogenous origin of urobilogen. The bilirubin entering the intestine undergoes gradual changes and, eventually in the large intestine, by means of bacterial decomposition, becomes transformed into urobilogen.

They remind us that the methods commonly used to determine the presence of urobilogen and urobilin are:—(1) Fluorescence in the presence of zinc salts; (2) spectroscopic absorption band; (3) production of a red colour by the addition of Ehrlich's aldehyde reagent.

A series of experiments on animals were carried out with the object, (1) of proving the relation between liver damage and increase of urobilogen in the urine, and, (2) to study the rôle of the intestine in the formation of urobilogen.

These experiments indicated to the authors' satisfaction: (a) That, in parenchymatous

changes of the liver, such as are induced by chloroform, there occurs a marked increase in the urinary urobilogen; (b) that urobilogen is formed normally in the intestinal canal by a process of decomposition of the bile pigment. Only in rare instances of intrahepatic infections, as in cholangitis, may the urobilogen be formed within the biliary radicles.

The clinical significance of urobilogen was studied in a series of over 1,200 cases, comprising catarrhal jaundice, cholangitis, cholecystitis and choledolithiasis, carcinomas of abdominal organs, cardiac decompensations, diseases of the haemopoietic system, granulomas, infectious diseases, malaria and also a group of miscellaneous conditions including a large number of normal persons.

They found that in normal urine the urobilogen seldom rises above a 1:20 dilution. They also found that all pathological conditions in which urobilogen was eliminated in excessive amounts, could be classified into two main groups: (1) Diseases of the liver and biliary tract, and, (2) hemolytic diseases. In the former, it is associated with parenchymatous changes in the liver, causing an absolute insufficiency in the mobilization of urobilogen, while in the latter, the increase of urobilogen is due to an increase in the bile pigment formation, which produces a relative insufficiency of the liver. Urobilogen was found in largest amounts in acute and subacute liver changes, and in exacerbations in the course of chronic processes. In comparing the phenoltetrachlorphthalein to the urobilogen test in various liver affections different results were obtained, and these the writers would attempt to explain by the difference in behaviour of the liver cells toward foreign substances. The authors consider that the constant presence of urobilogen in catarrhal jaundice, and its total absence in icterus, such as encountered in carcinoma of the head of the pancreas and of the biliary tract, forms a marked distinguishing diagnostic feature between this benign form of jaundice and those due to malignant causes.

L. C. MONTGOMERY

SURGERY

Cysts of the Spleen. Moynihan, Sir Berkeley, *Sur., Gyn. and Obst.*, June, 1925, p. 778.

Cysts of the spleen are either true or false. The true have a definite epithelial, endothelial,

or parasitic lining, and are angiectatic, neoplastic, or parasitic in origin. The false have a wall of tissue condensed during their cystic formation and are traumatic, inflammatory, or degenerative in origin.

True cysts.—The angiectatic cysts are really cavernous angioma, probably due to faulty development. When a sinus ruptures, a blood cyst is formed. The differential diagnosis between this type and the neoplastic is very difficult. Dermoid cysts, which are considered neoplastic in the author's classification, are very rare, only two cases being reported.

Hydatid cysts may involve the spleen only, but as a rule are present in other organs. If beginning in the central part, the splenic tissue forms the wall; if in the periphery, the spleen appears as a mass of adherent tissue, or if immediately beneath, the capsule may be pedunculated. Physical examination of such a spleen may reveal either one of two types: a cyst growing upwards and giving the "ascending and immobile" type, or one growing downwards, giving the "descending or mobile" type. The contents of these cysts may escape in any adjacent hollow viscera. Splenectomy for hydatid cyst is not always necessary. If centrally situated of course nothing else can be done, but if peripheral, marsupialization is the correct procedure. Contamination is unlikely if formalin has first been injected.

False cysts.—The traumatic cysts are of two kinds: First, small multiple cysts on the surface due to minute ruptures, with protrusion of splenic pulp and subsequent degeneration, or to inclusion of peritoneal endothelium; and second, large hemorrhagic cysts due to direct injury in which the capsule has not been torn. The inflammatory cysts are the result of (1) pyogenic infection, or (2) tuberculous involvement; the latter giving multiple cyst formation. Degenerative cysts are the end product of infarcts.

R. V. B. SHIER

Chronic Peptic Ulcer in Children. Proctor, Oscar S., *Surg., Gyn. and Obst.*, July, 1925, p. 63.

It is only of late years that peptic ulcer in childhood has been considered to exist with any degree of frequency. The author in reviewing the subject finds that previously no attempt has been made to separate the cases of acute ulcer from those of the chronic type. The ulcers discussed here are ones which have existed for two

months or more, have a raised and indurated edge, and show perigastric involvement in the form of adhesions, thereby denoting chronicity. Ulcers incident to a generalized infection or burns are excluded. The etiology is precisely the same as in adults but predisposing causes are wanting, such as stress and strain, worry, tobacco, etc. An acute ulcer may become chronic. Trauma, the swallowing of caustics, and malnutrition are causative factors.

The ulcers of gastric type are situated on the lesser curvature at or near the pylorus. Those in the duodenum are on the anterior surface. In the cases under study one-third were associated with definite stenosis of the pylorus.

The symptoms are the same as in adults; pain, coming on from one to three hours after food, which is relieved by food or sodium bicarbonate. Vomiting usually relieves the pain and the character of the vomitus is sour smelling. Constipation, loss of appetite, and retardation of development are common. Bleeding was noted in 40 per cent. and perforation in 25 per cent. This high percentage is due, the author thinks, to lack of diagnosis, and as an aid to diagnosis he refers to the value of the x-ray.

The treatment should be medical unless for stenosis, repeated hemorrhage, or perforation, for any one of which surgery is indicated. The usual surgical methods of excision, pyloroplasty, or gastro-enterostomy are applicable to the particular case.

From the study of the subject the author concludes that peptic ulcer is by no means as rare as formerly thought. The histories of 1,000 gastric ulcers and 1,000 duodenal ulcers in adults show that in the gastric type sixteen dated back to childhood, while in the duodenal twenty-six gave the duration of their symptoms as from four or five years of age. R. V. B. SHIER

ANATOMY

X-ray Studies on Bronchial Movements, and A Note on the Elastic Membrane of the Bronchial Tree of Mammals. Macklin, C. C., *Amer. Jour. of Anatomy*, No. 2, p. 303, xxxv, and *The Anat. Record*, 1922, xxiv, No. 3.

By careful selection of the subject and by giving due attention to technique, it is possible to obtain, in x-ray negatives of the normal human thorax, a fairly clear picture of the bronchial tree. If the subject is held in exactly the same position, and x-ray films taken with the thorax

in full expiration and full inspiration, we have a basis for comparison of the bronchial tree shadows of the two phases. It is then apparent that there is an elongation of the trunk and all branches of the normal bronchial tree in passing from full expiration to full inspiration, and a corresponding shortening for the transition in the reverse direction. These lengthening and shortening movements are very obvious changes, and there is little or no modification of the general direction of the bronchi, i.e., there is little or no angular variation. New space, in inspiration, is gained by elongation of bronchi, rather than by their spreading apart, though the latter movement is not absolutely ruled out. Thus the bronchi mark out lines of direction of expansion and contraction of the lung substance. When one thinks of it, it is obvious that the lung could not expand without an elongation of its bronchial skeleton, together with the associated structures—the blood and lymph vessels, and the nerves, and it would seem self-evident that interference with bronchial elasticity cannot occur without grave functional disturbance, and even consequent pathological change. Deflation of the lung, too, would not occur efficiently without an automatic contraction of the bronchi, for if they did not shorten, but remained flaccid during expiration, they would undergo bending and obstruction, with consequent trapping of air in the terminal spaces.

One would expect to find a strong development of elastic tissue in the bronchi to account for this movement, and this is, indeed, the fact. It has long been recognized that the bronchi are rich in elastic tissue, and the concentration of this in the tunica propria is shown in most of the histological text-books, but its functional significance has not heretofore been sufficiently clarified. This elastic membrane—a veritable arbor elastica—the author finds to extend from the larynx to the alveoli, and it makes a functional, as well as a structural unit. In a typical bronchus it is seen as a closely-felted aggregation of elastic fibres in the tunica propria, loosely connected with the sub-epithelial layer within, and with the cartilages and other tissues without. It is thus most favourably placed for the exercise of its function—that of permitting an

even and orderly elongation of the tubes in inspiration, and of bringing about a forcible shortening of them in expiration. Indeed it is not impossible that we have here to deal with the most potent agent in the recoil mechanism of the lung. Needless to say, the looseness of arrangement of the connective tissue, and the character of the epithelium, permit of these linear bronchial variations, and the muscle-coils simply separate upon lengthening of the tube, and close up during shortening.

It is found, too, that the bronchi dilate on inspiration and become narrowed during expiration: a variation obviously helpful in lung ventilation.

Important changes in the mediastinum are noted. We have been accustomed to look for a narrowing in inspiration, of this region; and in this way new space is gained, in the para-mediastinal regions of the pleural cavity, for the medially-expanding lung. Not all clinicians, however, are sufficiently impressed with the extensive amount of inspiratory downward movement of the lung roots, amounting to three-quarters of an inch or more, which the author's x-ray pictures show. The lower end of the trachea is quite moveable, contrary to the statements in some of the anatomical text-books, and it, together with related bronchi, blood-vessels, and other adnexa undergo a periodic up-and-down movement with respiration. The heart becomes longer and narrower, and its apex moves inward, during inspiration, and during this phase it pulls down upon the aortic arch. This structure, indeed, acts very much like a spring upon which the heart is suspended.

Freedom of movement in the lung-roots is regarded by the author as very important, for if it be abolished, or seriously interfered with, there must result an inhibition of inspiratory downward shifting of the lower mass of the lung, and unless this shifting takes place, as the author points out, the expansion of the apical region is much hampered, through lack of room. Keith has pointed out that diaphragmatic action is felt as far as the apex. It is suggested by Macklin that we look for a cause of apical tuberculosis in limitation of movement in the lung-root, through pathological change. C. C. MACKLIN

Medical Societies

ONTARIO MEDICAL ASSOCIATION MEETING

The forty-fifth annual meeting of the Association was held in Toronto on May 5th to 8th under the auspices of the Academy of Medicine, in whose building the business sessions were largely conducted and from whose membership had been chosen the chairmen of the various sections and committees. The more purely scientific sessions were held in the King Edward Hotel. There was a striking and proper absence of those misplaced entertainments which so often in the past have interfered with the orderly conduct of affairs; the lesson drawn from previous meetings where whole sections have been deprived of an audience by some function staged in business hours has been learned. An unusually good programme had been arranged and the plan of conducting a meeting in open session without sectional programmes was tried out; this met with general approval. Of the papers, twenty-three were contributed from Toronto, twenty from Canada elsewhere than from Toronto, and four from the United States of America. The Association was privileged to be addressed by Dr. S. Basil Hall, president of the British Medical Association both in the sessions and at the round table. It is not the custom to comment upon individual contributions, but it can be said that the profession at large will wait expectantly for the further confirmation of the highly suggestive results reported by MacDonald, as having occurred in human patients afflicted with hypertension, after injection with liver extracts. The striking reactions in animals subjected to the same line of treatment by Western University experimenters was referred to in Dr. MacDonald's demonstration, and their work must be considered as also highly suggestive. Symposia occupied but little space in this year's meeting; the sessions were excellently attended and 730 members were registered.

The round table dinner on May 5th brought out discussion on the question of ethics in connection with post-graduate lectures and newspaper contributions by the Association. The president's address: "The future of medical service," was delivered at the annual dinner on

Wednesday. Class dinners were held on the evening of the 9th. An unusually attractive lot of exhibits were in evidence, demonstrations of the otometer, of occupational therapy and of the "physician's selected library" may be specially remarked upon. The new Reception Hospital was open for inspection and visitors were addressed on Wednesday afternoon by Dr. Farrar, the physician in charge.

In the committee on general purposes, with an attendance of eighty-five, and Dr. Krupp in the chair, the report of the committee on necrology was received with members standing. It noted the deaths of Dr. W. H. B. Aikins, Toronto; Dr. J. J. Gee, Toronto; Dr. J. A. Greenlaw, Peterborough; Dr. J. W. Hart, Huntsville; Dr. W. Ray Hodge, Toronto; Dr. George W. Judson, Lynn; Dr. P. D. MacIntosh, Kitchener; Dr. W. H. Pepler, Toronto; Dr. J. A. Robertson, Stratford; Dr. Alexander Taylor, Goderich; Dr. D. Wallace, Ottawa; Dr. F. W. E. Wilson, Niagara Falls; Dr. G. F. Jones, Webbwood; Dr. D. M. Macklin, Stratford; Dr. S. J. Mellow, Port Perry.

Dr. T. C. Routley presented the report of the Board of Directors stressing particularly the holding of the National Conference in Ottawa, December, 1924, when problems of education, licensure and practice were debated. He noted that this conference had been suggested by the Ontario Medical Association; the work of the eighteen committees was reviewed. The report of the counsellors of the ten districts gives evidence that the value of the post-graduate courses is rated high; the visiting activities of the counsellors is apparent and the indications of organization are clear.

The report of the treasurer produced much favourable comment, and the excellent financial standing of the Association was considered a matter for sincerest congratulation.

In the report of the committee on credentials and ethics, attention was drawn to a letter sent to the Ontario Hospital Association concerning publication of hospital details apt to be embarrassing to the physicians of the staff. The greatest interest naturally centred upon the report of the committee on legislation and by-laws; as is known, the amendments to the Ontario Medical

Act of 1925 are largely the suggestion of the premier of Ontario and of the Honourable W. F. Nickle. The old Ontario Medical Act of 1923 is repealed, the definition of the practice of medicine is removed from the new Act of 1925, all drugless healers are placed in a class by themselves, and the use of the term doctor, physician or surgeon is forbidden to them, unless of course they are properly qualified practitioners according to the Ontario Medical Act. The vital part of the bill may be presented in full for the benefit of the readers of this *Journal*.

Section 49 of the Ontario Medical Act is repealed and the following substituted therefor:

- 49.—(1) Any person not registered pursuant to this Act who takes or uses any name, title, addition or description implying or calculated to lead people to infer that he is registered under this Act, or that he is recognized by law as a physician, surgeon, accoucheur or a licentiate in medicine, surgery or midwifery, or who assumes, uses or employs the title "doctor," "surgeon" or "physician" or any affix or prefix indicative of such titles as an occupational designation relating to the treatment of human ailments, or advertises or holds himself out as such, shall incur a penalty of not less than \$25.00 nor more than \$100.00.
(2) Subsection I shall not apply to any licentiate of dental surgery or any other person admitted to practise dentistry or dental surgery under the provisions of The Dentistry Act nor to any person registered as a pharmaceutical chemist under The Pharmacy Act.

The Ontario Medical Act, 1923, is repealed and notwithstanding anything in the Interpretation Act contained such repeal shall have effect as if the said Act had never been enacted and all acts and proceedings taken under and by virtue of the said Act are declared to be void and of no effect.

It is the general opinion that this is one of the best pieces of medical legislation which has ever been enacted. In contradistinction to the views on this bill may be noted the fact that the committee disapprove of the amended optometry Act which even allows the establishment of "faculties" of optometry if so desired. The same committee reported on the relation of practitioners to the Ontario Temperance Act, and report that certain changes have been made; the cutting down of the number of prescriptions from fifty to thirty a month should be noted. Dr. G. W. Ross, in speaking, agreed to bring before the committee on general purposes a résumé of the legal aspect of the Ontario Temperance Act; this was presented in the afternoon session. Some detail of this must be put before

the profession; it is to be realized now that the exceeding of thirty prescriptions a month is an offence against the statutes of the province of Ontario and punishable by fine, a "statutory offence"; previously, the issuing of over fifty prescriptions per month was simply the breaking of a regulation which brought the offender into conflict with the license commission board, and the discipline committee of the College of Physicians. The joint advisory committee was heartily thanked for their labours in connection with this question of medical legislation.

The reports of the committee on education, of the joint advisory committee, of delegates to the Canadian Medical Association, of advisory committee to the board of license commissioners, of the editorial board, of the committee on hospitalization, were received and adopted.

The report of the committee on tariff was received and considered in two sections, the question of the propriety of a pre-operation diagnostic fee was actively discussed, the possibility of confusing such fee with fee splitting was debated. It was finally decided to give the diagnostic fee a place on the Ontario Medical Association tariff; contract practice was considered as differing essentially from lodge practice.

Dr. Farley in reporting on county health centres spoke of the needs in Hastings county and urged that the Ontario Medical Association request assistance from the department of health. It was suggested that relief might be obtained from the Red Cross. A communication was read from the Graduate Nurses Association of Ontario requesting the Ontario Medical Association to petition the government department of health to aid such rural communities as could not support a practitioner. Dr. Farley's report was received and adopted.

In presenting the reports on industrial medicine Dr. Henderson asked that the members report to the committee cases of industrial intoxication; the report was received and adopted.

The reports of the Workmen's Compensation Board were received and adopted. In this report the chairman, Dr. Marlow, states that it was thought opportune to make some representation to the provincial government, with the view of bringing about some changes whereby medical services performed for the board might be placed on a better basis and be accorded more fitting recognition; the committee, he further stated, had considered that two points should be stressed

first, that there should be at least one medical member on the Workmen's Compensation Board, second, that there should be a thorough reorganization of the medical services of the board. The complete draft of the resolution is as follows:

WHEREAS the purpose of the Workmen's Compensation Act is to alleviate the ills arising from injury or industrial disease by furnishing efficient medical aid to the workers and to compensate them during their period of disability or to provide recompense in case of partial or complete permanent disability; and

WHEREAS the estimation of the amount and probable period of disability is founded upon medical opinion arrived at through professional study, observation and experience; and

WHEREAS the assessment of percentage disability of a protracted or permanent nature is obviously a matter in which experienced medical opinion must be taken into consideration; and

WHEREAS many inconsistencies in the awards by the Workmen's Compensation Board have come to the attention of the medical profession of Ontario and such have been the result of the failure of the Board to take medical opinion into account; and

WHEREAS though medical reports are available in each case for the guidance of the Board, under the present system of administration the interpretation of these reports is largely governed by legal or clerical opinion.

THEREFORE BE IT RESOLVED THAT:—

1.—For the proper interpretation and administration of the Workmen's Compensation Act, selection for appointment to the Board should be founded upon previous employment, citizenship and general suitability.

2.—There should be at least one medical member on the Board.

3.—Such medical member should be carefully selected. His experience in medical and surgical practice should be such as to ensure his ability to correlate and interpret medical reports in such a manner that he may bring to the Board logical opinions arrived at as the result of professional experience, study and scientific knowledge, without which the Board will often fail to do justice to the workers on the one hand, and on the other may over-estimate disability or unduly prolong compensation.

4.—His professional standing and ethical integrity should be of such a high degree as to command the confidence and cooperation of the medical profession of Ontario.

5.—His administrative ability should be of a high character and he should have supervision over the organization of the medical services of the Board and should see that all medical matters are relegated to the medical staff.

6.—The medical staff of the Board should be reorganized so as to promote (a) Recognition of authority. (b) Cohesion and cooperation. (c) High standard of ethics. (d) Cordial and more intimate relation with the medical profession and medical institutions. (e) The attainment of more exact reports on the condition of the workers. (f) More personal knowledge of such, in association with the medical attendant, where circumstances and distance permit; and adequate arrangements to offset distance. (g) Efficiency, which, without proper organization, it is impossible to attain.

7.—The senior medical officer employed by the Board should be director of the medical services of the Board and should be responsible for the organization and administration of the medical services.

8.—He should have a sufficient number of medical and clerical assistants to adequately and efficiently carry

on the work of this department, and members of his staff of medical officers should be largely relieved of clerical duties.

9.—His supervision of medical work for the Board should extend throughout the province, and in areas not easily accessible he should be represented by well selected medical referees, remunerated in accordance with the services performed.

10.—In cases of extraordinary difficulty of importance, in which the usual medical reports or specialists' reports are not conclusive it should be in order to assemble a medical board of three to conduct an examination and forward their opinion before final disposition of the case is arranged. Such a board should not be permanent but its members should be chosen in each case because of their particular qualifications and ability to advise conclusively in the case under consideration.

11.—The medical services of the Board should be brought to such a high standard of efficiency as to promote: (a) Adequate and well recognized scientific treatment for all workers coming under the provisions of the Act, so as to eliminate disability and hasten recovery and return to work, and in cases in which there is permanent disability, to minimize this to the greatest possible extent by suitable measures and appliances. (b) The attainment of such records and reports as will supply, through the medium of medical opinion, the basis for reliable assessment of disability, both as to duration and amount.

BE IT FURTHER RESOLVED, that a copy of this resolution be sent to the premier of the province of Ontario, and also to the attorney-general, and that it be intimated to them that if any changes in the Act or the constitution of the Board are contemplated, the Ontario Médical Association would appreciate the opportunity of appearing before the government, in a small representative deputation, to present this resolution in person, and to discuss the matter in greater detail.

Dr. Routley remarked that in Alberta there has been appointed a medical officer who shall act as additional referee.

The report of committees of public health and mental hygiene were received and adopted in the absence of their respective chairmen.

At the next session the reports of the committee on Inter-relations was presented at length by Dr. H. W. Hill, chairman. This included the reports of the sub-committees on press publicity, on public education through local medical societies, and, the hospitals, by Dr. Gordon Bates, J. P. Morton and C. H. Hair, their respective chairmen. This concluded the business programme of the Association.

New business transacted: The applications for affiliation of the Porcupine district and Dufferin county were received. The committee from the doctors of Thorold asking for redistribution was approved. Dr. Colbeck moved that the committee recommend that the Association pay the legitimate expenses of the counsellors in attending meetings of the board of directors; this was approved.

Dr. Henderson reported that he had received a letter from the pharmaceutical manufacturers asking that the Ontario Medical Association co-

operate with them in the matter of obtaining an amendment to the narcotic drug Act, which requires a physician to furnish a signed and dated order when purchasing certain drugs classified as narcotics. It was moved by Dr. Henderson, seconded by Dr. Moore, that the Ontario Medical Association recommend to the Canadian Medical Association that they take such steps as they consider advisable in approaching the government of Canada to relieve the physician from some of the difficulties which arise out of the opium and narcotic drug act, 1923, such as the necessity of furnishing a signed order when purchasing such preparations as are sufficiently medicated to prevent their use for their narcotic content, decision in regard to the sufficiency of medication to lie with the Board of Health. Carried.

The Secretary presented the following resolution from the Hamilton Medical Society:

"The Hamilton Medical Society desires to go on record as being opposed to the placarding of the two diseases chickenpox and mumps, on account of the trivial symptoms manifested by both, and also on account of their negligible mortality."

It was decided to refer this matter to the committee on public health.

It was moved by Dr. Colbeck, seconded by Dr. Farley, that the committee on necrology co-operate with the President and Secretary of the Ontario Medical Association and the committee of the Academy of Medicine, Toronto, in taking up the question and deciding what steps are necessary to procure the desired information and put it on record.

Dr. Young moved an amendment, which was seconded by Dr. Grant, that a committee composed of Doctors Ferguson, Powell, Gwyn, Colbeck, Fotheringham and J. C. Connell, with power to add, be appointed to take up the question of procuring all available information with reference to the history of medicine in Ontario, and placing it on record. Carried.

The secretary remarked that for some time he had thought the Ontario Medical Association could be doing some useful work in connection with the students in our medical schools. The American Medical Association has a system of

following through the medical schools the course of every student from his first year on. He would like it to be considered, say until the semi-annual meeting, whether or not it would be available for the Ontario Medical Association to work out a follow-up system along similar lines, at the same time, bringing the Ontario Medical Association before the students. Two purposes could be accomplished; interesting and useful information could be secured, and the interest of the students through their college years could be obtained. In this connection the following remarks made earlier in the day on the question of increasing the membership may be made.

Dr. Gwyn: The graduating classes of the three universities should be met in their final year by the officers of the Ontario Medical Association, and, as each student graduates, he should have in his possession a circular from the Ontario Medical Association notifying him of its existence and its desire to have him affiliated with it when he goes out into the world. Dr. Bruce Hopkins suggested that every graduate from the three Ontario medical schools be automatically admitted as a member of the Ontario Medical Association for the first year after graduation.

Dr. Elliott reminded the committee that this action would not be constitutional; and recommended that the matter be sent forward to the committee on legislation and by-laws for their consideration.

It was decided that the directors be instructed to appoint a special committee for the purpose of inquiring into ways and means by which the membership could be increased; and that they report to the semi-annual business meeting of the Association; and further, that the matter of admitting into membership in the Ontario Medical Association all graduates, for the first year after graduation, be referred to the special committee mentioned above.

On motion, the meeting adjourned at 5.45 p.m. after it had been moved, seconded and agreed that this meeting approved of the work of the committee on general purposes as far as completed.

Golfer:—"Doctor, you remember you recommended golf to take my mind off my work?"

Doctor:—"Yes."

Golfer:—"Well, can you prescribe something now to get it back again?"

Miscellaneous

ANALYSIS OF A PATENT MEDICINE

The following notes are made from the column of "The Propaganda for Reform" of the *Journal of the American Medical Association*, regarding the nostrum "Raz-Mah," which is advertised both in the United States and in Canada, as a treatment for hay-fever and asthma.

Reports had been received from various parts of the continent asking for information as to the composition of Raz-Mah, as it evidently contained drugs of some potency. Two separate reports had already been made, one by the Department of Health at Ottawa, and the other by the A.M.A. Chemical Laboratory, which showed that each "Raz-Mah" capsule contained little more than aspirin, caffeine, and charcoal. In September, 1924, however, an even more complete laboratory analysis of the substance was made, and it was found that while samples differed somewhat in composition, the powder was essentially a mixture of caffeine, aspirin and an iodide. In one sample, oil of spearmint replaced the iodide, and it is suggested that the latter was probably accidental, and that the varying composition may be due to careless methods employed by the nostrum manufacturers, or, perhaps, may indicate that for reasons best known to themselves the exploiters of "Raz-Mah" have seen fit to change the formula.

In any case, it has been quite sufficiently proved that the nostrum contains little more than powdered aspirin and caffeine, but as the proportions of these in each capsule are four grains and half a grain respectively, it can be seen that the maximum daily dose recommended of eight capsules might easily be productive of untoward effects.

NOTES ON ORGANIZATION OF BANTING RESEARCH FOUNDATION

We have received the following details in regard to the organization of the Banting Research Foundation in Toronto, which has been established with a view to discovering means for the prevention and also for the cure of diseases at present regarded as incurable.

This Foundation is a corporate body separate

from the University of Toronto, it being pointed out that the funds of the university, which are supported by the province, are distinctly for the purpose of training students and developing the members of its staff. The university has no means available with which to investigate problems brought to it by independent workers or to aid workers in other universities or colleges.

It is thought that the income from \$500,000 will suffice for the support of the Foundation for some years to come, and it is proposed to make the funds available to aid medical men who have reasonable problems, either working independently or in any other university in Canada.

As regards control of the Fund the endowment will be invested under the direction of the Board of Governors of the University of Toronto who will act as trustees, and who will pay over to the governing body of the Foundation the annual income from the endowment for disbursement. The present Board of Foundation consists of Sir Robert Falconer, Lieut.-Col. R. W. Leonard, Rev. Canon H. J. Cody, O. S. MacDonald, W. E. Gallie, M.D., Professor J. G. Fitzgerald, Professor V. E. Henderson and John W. Rogers.

For the work of the Foundation space is available in the laboratories of the University of Toronto and also in some of the other Canadian universities.

Neither Dr. Banting nor Dr. Best will receive anything from this Foundation. Both Dr. Banting and Dr. Best have renounced all rights to any income from royalties or patent rights from the sale of insulin.

A lay-committee headed by the Right Hon. Sir Wm. Mulock has been formed to raise the necessary funds. The executive of this committee consists of Mr. E. R. Wood, Chairman; Mr. E. R. C. Clarkson, Hon. Treas.; T. G. McConkey, J. E. Atkinson, Col. G. F. McFarland, C. S. MacDonald and H. Sculley. The response to the appeal has so far been most encouraging.

INTER-STATE POST-GRADUATE ASSEMBLY OF AMERICA

We have received a copy of the programme for the Inter-State Post-Graduate Assembly of

America, to be held at St. Paul, Minn., October 12 to 16, 1925. Each day is completely filled with three sessions, beginning at seven in the morning, and continuing on into the evening, and the various branches of medicine are very completely covered by clinics and addresses. Review exhibits will be on view between each session.

The foreign guests who will take part in the

proceedings include, Sir William Arbuthnot Lane, Mr. William Blair Bell, Professor Vittorio Putte, of Bologna; Mr. Philip Franklin, of London, England; Dr. H. L. McKisack, of Belfast, and Dr. W. H. Parkes, of Auckland, N.Z.

The proceedings will be closed with a banquet at which there will be addresses by distinguished citizens of America and foreign countries.

Shoe Dye Poisoning.—C. W. Muehlberger, Madison, Wis., has found a total of forty-seven cases of poisoning from shoe dyes reported in the literature. Of these, twenty-five resulted from dyes containing nitrobenzene, and twenty-one from dyes containing anilin. The toxic substance responsible for one case was not stated. One of the cases of nitrobenzene poisoning resulted fatally. All the reported cases of anilin poisoning from shoe dyes are from European sources, while all those of nitrobenzene poisoning are from the United States. The nine cases reported by Muehlberger are the first of anilin poisoning from shoe dyes to be reported in the United States. The outstanding symptoms of poisoning exhibited in these cases are: marked cyanosis, weakness and vertigo followed by rapid pulse, headache, vomiting, somnolence and chills. The only treatment required is the removal of shoes and rest in bed until the cyanosis disappears. Oxygen inhalation is without effect on the cyanosis. Digitalis medication is without avail and is not indicated. The chemical analyses of four commercial preparations of black shoe dye are given. All these were found to contain either nitrobenzene or anilin. The only way that this type of poisoning can be adequately prevented is by state or national health regulations prohibiting the manufacture and sale of toxic shoe dyes. It is recommended that nitrobenzene and anilin be replaced by nontoxic solvents in order to eliminate the danger of poisoning.—*Jour. A. M. A.*, June 27, 1925.

The Heart in Influenza.—A lecture was given before the Interstate Post Graduate Assembly of American Physicians in London, by Dr. Strickland Goodall, whose subject was "The heart in influenza." He said that a critical sur-

vey and analysis of the history of large numbers of heart cases which he had had the opportunity of examining carefully during the past twenty years had convinced him that the etiology of heart disease in this country was changing. Up to a few years ago the only antecedent disease to which any attention was paid in connection with heart trouble was rheumatism, and if it was found that the patient had suffered from no rheumatic manifestations very little heed was paid to any other complaint from which he might have suffered. Within the last few years one had been struck by the fact that there were a very large number of cases in which definite heart involvement occurred with an antecedent history of influenza. He showed electrocardiograms of cases every one of which had been the subject of the most critical examination for rheumatic history, and no such history had been elicited. These were cases of acute paroxysmal tachycardia of the ventricular region, or auricular fibrillation or flutter, all following upon mild influenza. It was not true that influenza gave rise to a poison which caused many different diseases; all these conditions represented injuries to the myocardium, which was poisoned, with consequent impairment of function. The influenza virus was a muscle poison which might attack any part of the heart. If it attacked the auricle it gave rise to auricular fibrillation or flutter; if it attacked the bundle of His it gave rise to heart-block, temporary or permanent; and if it attacked the ventricles it gave rise either to extra-systoles or to ventricular fibrillation. The myocardial condition following on influenza might develop from seven to twelve days after everything seemed well, the gastro-intestinal disturbance having cleared up, and the doctor having ceased his visits.—*Brit. Med. Jour.*, June 13, 1925.

Obituaries

The following is in addition to the obituary published in last issue.

Leverett George DeVeber died July 9, 1925. The passing of L. Geo. DeVeber, as he always signed his name, deserves more than casual mention. He resided continuously in Southern Alberta for over forty years, during all of which time he was active in his professional and political duties. He was at one time the only physician in what is now the Province of Alberta. He is popularly supposed to be the original of the character of the doctor in a well-known book of western fiction. His early professional experiences must have been arduous. Among them was a ride of approximately 170 miles each way, on horseback, accomplished in eighteen hours, during which he changed horses four times, every one of the relays, except the one with which he started, beginning by doing its best to "buck" him off, and one of them accomplishing it. He was here when civilization was rather crude. The writer has heard him tell of being awakened by the sound of shooting in the street with stray bullets coming splintering through the walls of his shack above his bed, and of how he solved the problem of safety by standing his mattress on its edge against the wall and philosophically returning to sleep in its lee. He remained to see prosperous ranches, farms, villages, towns and cities develop all over, what was when he came, virgin prairie.

A handsome man of athletic physique, wearing to the last a thick crop of his own smooth black hair, even at the time of his death only slightly dusted with grey; a social soul of pleasing address, and attractive manners; a man of well-marked professional ability, and abundantly endowed with the milk of human kindness which should accompany it; a man whose word was as good as his bond, and who treated others as if they, without doubt, had the same characteristic. He will long be remembered by the great majority of his acquaintances in Southern Alberta, including his political opponents and professional competitors.

P. M. CAMPBELL

George Sterling Ryerson. The medical profession of Canada has lost one of its outstanding members in the death on May 20th, of Major General George Sterling Ryerson. Dr. Ryerson had been in his usual health and vigour until May 1, 1925, when he suddenly developed symptoms of intestinal obstruction which examination showed to be associated with a large abdominal tumour. Operation undertaken for his relief discovered a moderate sized intraperitoneal lipoma which was removed, but in addition there was a large retroperitoneal sarcoma which could not be removed on account of its wide attachment to the posterior abdominal wall, and a week later he suddenly collapsed and died within a few hours.

The late General Ryerson was born in Toronto January 21, 1855, the son of George and Isabella (Sterling) Ryerson, and nephew of the late Rev. Dr. Egerton Ryerson. He received his preliminary education at the Galt Grammar School and studied medicine at Trinity Medical College, Toronto, Edinburgh University, and in Vienna. He began practice in Toronto in 1880 and two years later was appointed Professor of Ophthalmology in Trinity Medical College and retained the same post in the University of Toronto after amalgamation of the medical colleges in 1901. He served for many years on the staff of the Toronto General Hospital and later on the Toronto Western Hospital.

In addition to the practice of his profession, Dr. Ryerson took an active interest in military matters, in politics, the St. John's Ambulance Association and the

Red Cross, as well as in various medical organizations. During his military career he was surgeon to the Royal Grenadiers, Toronto; was through the Fenian Raid, 1870; the North West Rebellion, 1885; was Red Cross Commissioner during the South African war, 1900, and the Great War, 1914-1918. His military services were recognized by his advancement to the rank of Colonel-in-chief and Honorary Major-General C.A.M.C.

He represented East Toronto as conservative member in the Ontario Legislature, 1892-98. He was a past president of the Toronto Clinical Society, the *Esculapian Club*, Canadian Red Cross Society, St. John's Ambulance Association, Association of Medical Officers Canadian Militia and U.E.L. Association. He was a frequent contributor to current medical literature, besides being author of *The Soldier and the Surgeon and Aftermath of Revolution* and "Looking Backward" published during the past year.

Dr. Ryerson was a patriotic Canadian, an Imperialist, an active Freemason, an Anglican and a Conservative. He was a man of untiring energy, of good executive ability and possessed social qualities which made him an interesting companion and won him a host of friends.

H. B. ANDERSON

Dr. James Ross Collie. The Nova Scotia profession has lost, in the death of Dr. J. R. Collie, one of its oldest and most revered members. Born eighty-seven years ago, graduated at Harvard in 1869, he had resided at River John until his death, which occurred on the eleventh of July. For well over half a century he carried on a large practice over an extensive territory. His kindly manner, sterling character and keen interest in his patients won for him a firm place in the affections of all with whom he came in contact. While eminently qualified for any field of practice, he felt that a country practice gave opportunity for the type of service which most appealed to him, and it was his ambition to be a good country doctor. He travelled rather extensively, read widely, and was an excellent and interesting conversationalist. For many years he represented his district in the municipal council of Pictou County where his intimate knowledge of a large part of the country and his native shrewdness made his services of peculiar value. More than once he declined nomination as a candidate for both provincial and federal parliaments because election would require too long absences from his practice. When, a few years ago, advancing years required him to retire from professional work, there was widespread regret throughout the large district he had served so long, so faithfully, so successfully, and his death is sincerely mourned not only by his colleagues but an unusually large circle of devoted friends.

Dr. Murdock H. Macaulay, well known physician of Calgary, died on August 9th, after an illness of several weeks. He was born in Cape Breton, N.S., in 1864. Following his graduation in medicine from Dalhousie University, he practised for a number of years in Nova Scotia. In 1907 he moved to Edmonton, and in 1913 to Calgary.

Joining the Canadian Army Medical Corps in 1916, he served overseas until 1918, when he was invalided on account of disabilities sustained when on active service. He was a member of the Royal Institute of Public Health of London, England. He is survived by his wife and three sons, one of whom is attending McGill University.

Dr. Samuel John Kirk of Macleod, died suddenly August 7th at the age of fifty-seven. He was a grad-

uate of Manitoba University and practised several years at Hamiota, Manitoba, moving to Field, B.C., in 1913, and afterwards to Macleod, Alberta. He was highly esteemed in the community in which he practised his profession. He leaves a wife, a son and two daughters.

G. E. LEARMONTH

William Somerville Woodworth. After more than fifty years of service in the practice of medicine, Dr. William S. Woodworth died at Kentville, N.S., on the twenty-second of July. Dr. Woodworth graduated at Harvard in 1873, and practised near Kentville until 1899, when he moved into that town and resided there until his death. He enjoyed a large practice, and the esteem in which he was held by his fellow citizens was evidenced when, about two years ago, the jubilee of his graduation was marked by the presentation of a laudatory address and a purse of a thousand dollars in gold. In that year, also, he was made an honorary member of the Medical Society of Nova Scotia. Dr. Woodworth's death followed an illness of several months duration. He had reached his seventy-eighth year.

W. H. HATTIE

Dr. James Newell died at Watford early in June in his seventy-seventh year. A graduate of Queen's he had settled in Watford thirty-two years ago after practising in Detroit, and elsewhere in western Ontario. He was coroner for the County of Lambton and for thirty years had been a member of the High School Board.

Dr. Stuart Trail Smellie died in Port Arthur in the month of June in his seventy-fifth year. Dr.

Smellie had settled at Port Arthur before the coming of the railway, and had later been the physician for the railway at that point, he was the local registrar in this district and had been elected to the Legislature in 1905.

Dr. Eugene Octave Bedard known in the back country from Mattawa and North Bay to Pembroke died in the latter town on June 22nd. A French Canadian of the best type he had come to Pembroke in the early eighties after his studies in Paris and had practised uninterruptedly for over forty years.

Dr. Archibald James Geikie, son of the old Dean of Trinity, died in Toronto on June 15th. A graduate of both Trinity and Toronto he began the practice of medicine in Toronto in 1878 and continued up to twelve years ago when failing eye sight compelled his retirement.

Dr. Charles Ballantyne died in Ottawa on June the 10th in his fiftieth year. He was a graduate of McGill in 1900 and was for some time on the staff of the Royal Victoria Hospital, Montreal.

Dr. James Robert Laing, formerly of Montreal, died at Hamilton recently. Dr. Laing graduated from McGill in 1917 and after serving overseas with the Army Medical Corps, was attached to staffs of the Montreal and Hamilton General Hospitals, for a time.

Dr. G. M. Brown who had practised at Port Arthur for forty years died there on May 29th.

Incidence of Infection in Tonsillectomized Children.—A large number of children, that had been operated on, selected from all the school children, either because their tonsils and adenoids appeared obstructive and diseased or because the child's history suggested tonsillar infection, were made the subject of study by Kaiser. Twelve hundred of this group were examined three years after operation and the incidence of infection ascertained during this period. The most common infection in the child that had been operated on, elicited at the time of operation, was frequent attacks of sore throat and tonsillitis. Out of the 1,200 operated children, 674, or more than half the group, had been subject to tonsillitis previous to operation. During the last three years since the operation, only 10 per cent. complaining of this symptom failed to get relief from the operation. Frequent head colds were complained of by nearly half of the children in this group previous to operation. During the last three years 146, or 27 per cent., were still subject to fre-

quent head colds. Obviously, head colds are not eliminated when tonsils and adenoids are removed. Enlarged or swollen cervical glands are generally looked on as due to infections originating in the throat, ears, teeth or scalp. The presence of enlarged glands is often the chief indication for the removal of tonsils. It is, indeed, a common infection in children, for in the 1,200 children in this group there was evidence of enlarged cervical glands in 81 per cent. Of this number 68 per cent. were only moderately enlarged, while 15 per cent. were considerably enlarged. A previous re-examination of these children showed that there was no great reduction in the incidence of swollen glands one year after operation, but in the next two years there was a considerable reduction, for at the end of the third year after operation the incidence had been reduced to 4.5 per cent. Since the operation forty-eight children, or 4 per cent., who had never had swollen glands before, developed enlarged cervical glands.—*New York State Jour. Medicine*, March 20, 1925.

Medical News from the British Empire

GREAT BRITAIN

THE OPENING OF THE NEW BUILDING OF THE BRITISH MEDICAL ASSOCIATION

The new headquarters of the British Association were opened by His Majesty the King accompanied by Her Majesty the Queen, on July 13th with appropriate ceremonial and in the presence of the most representative gathering ever brought together in the name of British medicine. The weather was perfect; bright but not oppressively hot and the red brick and white stone facing of the House looked their best under a blue sky. The Gates of Honour, shortly before the arrival of Their Majesties, were dedicated by the Most Reverend His Grace the Archbishop of Canterbury, who wore his Convocation robes and was accompanied by his Chaplain. The service began with the hymn "O God, Our Help in Ages Past" led by the band of the Grenadier Guards. The Chairman of Council then addressing the Archbishop said, "In the name of the British Medical Association I ask your Grace to dedicate these Gates which have been made and placed here in memory of the members of our Association who laid down their lives in the Great War." After a short prayer the Archbishop, advancing to the gates pronounced the dedication in the following words: "To the Glory of God, and in memory of those members of the British Medical Association who gave their lives in the Great War we dedicate these Gates in the name of the Father and of the Son and of the Holy Ghost, Amen." Sir Edwin Lutyens, the architect, presented the key of the gates to His Grace who unlocked and opened them amid an impressive silence. The gates being open the Archbishop said, "In gratitude and hope we open these Gates, *Dominus custodiat exitum et introitum.*" The ceremony concluded with the singing of the hymn "Abide with Me."

Punctually to the hour Their Majesties drove up to the entrance in semi-state in an open landau drawn by four horses and preceded by outriders. Accompanying them was the Right Honorable Neville Chamberlain, M.P., Minister

of Health. Various presentations took place at the gates and afterwards in the Member's Common Room on the right. The Great Hall was entered from the south so that Their Majesties walked the whole length of the Hall which was already filled with representative members of the Association and delegates from the Associations in the various overseas Dominions and from other countries, all in brilliant academic regalia.

On reaching the dais the King was presented with an address by the Chairman of the Council and replied as follows, all those present in the Hall standing:

HIS MAJESTY'S REPLY

I am pleased to come here, accompanied by the Queen, to open the new and admirably designed House of the British Medical Association. We have always taken a sincere interest in the science and practice of medicine and surgery, and I am proud to have succeeded my Father, King Edward, as Patron of your Association. Since its foundation, nearly a century ago, by Sir Charles Hastings, your Association has shown a remarkable increase both in membership and usefulness; and the well informed and constructive criticism that it brings to bear upon the evolution of your profession is of great value. The British Medical Acts wisely restrict admission to the *Medical Register* to those who have been trained in accordance with prescribed regulations and have passed the necessary qualifying examinations. At the same time vigilance must always be exercised in order that your profession may keep abreast with the advance of science, and also preserve a high standard of professional practice and ethics. The noble purpose, the character and the skill of those engaged in the art of healing, are your most precious traditions, and you do well jealously to watch over such attributes.

I am glad to notice your recognition of the advantages of post-graduate study, in which my brother-in-law, Lord Athlone, a former Chairman of the Middlesex Hospital, has taken such a deep interest.

The reference in your Address to the ever-widening scope of the medical practitioner in relation to the general health of the people is most satisfactory, and I have followed with sympathy the negotiations for securing smooth and effective co-operation between him and the public medical services. The welfare of my people at home and throughout the Empire largely depends upon an efficient and well organized health administration. The protection of maternity, the care of the child, a sanitary home and workshop, the safeguarding of the food supply, properly designed defences against infection and prevalent disease, are all matters of vital importance. There is also an opportunity for the medical practitioner in his everyday practice to be a missionary and teacher of public hygiene and of personal health.

On behalf of the Queen, I thank you for your allusion to her interest in the education and work of medical women, and on this occasion we are both glad to express our appreciation of their activities in all branches of medicine.

I am especially pleased to learn of the close and friendly relations maintained between members of your

profession in all parts of the Empire; and I heartily welcome here to-day representatives from the Dominions beyond the seas and also from European countries and from the American Medical Association.

At this point the King was handed by the architect a master key in gold, and he concluded his reply with the words:

I have much pleasure in declaring open this House of the British Medical Association, and I congratulate its members upon the possession of their new and dignified home.

After the reply of the King further presentations were made. Among those presented were the delegates from the various overseas Dominions, the representatives of the American Medical Association and of the profession in France, Holland, Norway, Sweden and Denmark. Dr. Alexander Primrose, Chairman of the Council of the Canadian Medical Association represented Canada, and Dr. De Schweinitz represented the American Association.

After these presentations Their Majesties, accompanied by the Archbishop of Canterbury, the Minister of Health and the members of the Reception Committee inspected the Library and especially the Association's Roll of Honour. Before leaving, Their Majesties wrote their autographs in the visitors' book. After Their Majes-

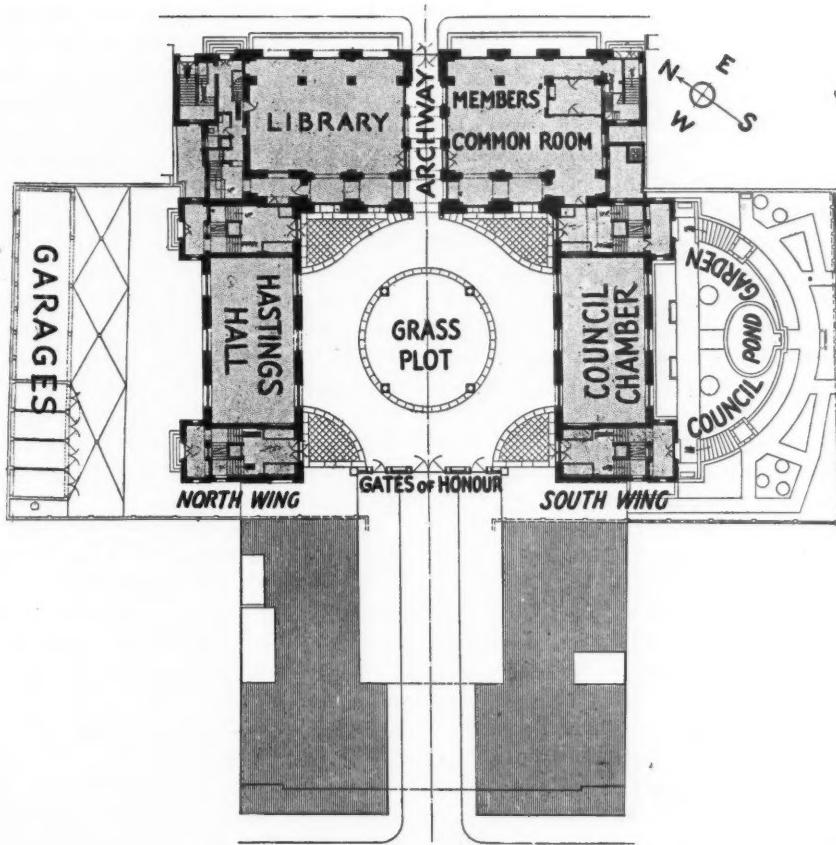
ties had left, there was a general inspection of the building and tea was served in the Members' Common Room. All the arrangements were carried out with absolute precision. Loudspeakers placed in suitable positions throughout the building enabled not only those in the building to hear what was said outside the building, but those on the outside to hear what was spoken in the Great Hall. Every syllable of the King's speech was heard with distinctness.

THE NEW HEADQUARTERS OF THE BRITISH ASSOCIATION

The situation of the new headquarters of the British Association is regarded as one which will in the near future not only become more suitable in its immediate surroundings but also greatly increase in value as it is on the direct route from Kingsway to King's Cross. The building had been at first planned as the home of a semi-religious philosophical organization but on the commencement of the war work on it was stopped and it was taken over by the Government for its own use. When the war



THE NEW HEADQUARTERS OF THE BRITISH MEDICAL ASSOCIATION



GROUND PLAN OF SITE OF THE ASSOCIATION'S NEW HOUSE

The building as it stands is indicated by stippled shading; the sites of the proposed future extensions, on each side of the roadway from Tavistock Square, are shaded in vertical lines.

was finished it was offered for sale by the Disposals Board and acquired by the Association on very advantageous terms and shortly afterwards a lease of the ground was obtained from the Duke of Bedford's estate for 200 years.

The building in its still only partially completed state was referred to Sir Edwin Lutyens for plans to render it suitable for the Association's requirements and to him much of its present excellency is due. The buildings face on three sides of a quadrangle with a large open court in the centre. The court is separated from Tavistock Square by the beautiful Memorial Gates erected in honour of those members who fell in the Great War. On approaching it from Tavistock Square the first object that strikes the eye are these Gates of Remembrance surmounted by a bronze shield bearing in letters of gold the legend *Memory and Praise*. The

court is named the Court of Honour; its borders are paved with flagstones while in the centre is a large circular grass plot with a wide kerb of white stone.

Facing the gates is the central building with lofty windows and Corinthian pillars supporting a pediment of classical design. This central building contains the great hall, a very imposing room one hundred and thirty feet long. Its roof is supported on semi-circular arches of light steel framing which remain un eased except at each end where a bay is surmounted by a painted vault moulded to the shape of the arches behind it. The inside of the roof itself is painted in a deep green colour (nocturnal green) against which the semi-circular steel ribs appear as narrow arches of gold. The whole is supported upon a row of Corinthian pillars painted a brilliant shade of peacock blue. At the north

end of the hall is a dais and at the south a gallery from which the lady visitors to the opening ceremonies obtained a view of the proceedings.

Entering the vestibule below this Great Hall on the left is placed the Library panelled in Spanish mahogany transferred from the old home of the Association, and on the right the Members' Common Room, a spacious apartment overlooking the Court of Honour. Below these rooms are the basement offices containing the staff dining rooms, printing machine rooms, and storage accommodation for the Library.

In the north wing is the Hastings Conference Hall of convenient size and appropriately decorated. Above it are the general offices. In the south wing are the Council Chamber and several committee rooms, and above these are the offices of the Medical Secretary and his assistants. For the present the fourth floor is arranged as a residential flat.

While the main buildings were erected before the war, all the internal arrangements and decorations, which necessitated many alterations, were carried out under the supervision of Sir Edwin Lutyens.

The building as a whole has been described by the architectural correspondent of *The Times* as in the tradition of Wren, and slightly reminiscent of Hampton Court. "The exterior is dignified, scholarly and businesslike, and is so well proportioned, and so discreet in character, that it gives the impression of always having been there."

INTERESTING HISTORICAL FACTS CONCERNING THE
SITE OF THE HEADQUARTERS OF THE
BRITISH ASSOCIATION*

The British Medical Association in acquiring their magnificent new headquarters have obtained a site rendered interesting as the former residence of several notable English writers and artists. Although at present surrounded on all sides by crowded thoroughfares it was considered, little more than a century ago, to be one of the pleasantest outskirts of the city of London, having a charming view of the heights of Hampstead and Highgate in the distance.

*Abstracted from a paper "Historical Notes on the Site of the Association's New House," by E. Muirhead Little, F.R.C.S., *British Medical Journal*, July 18, 1925.

In a map published in 1801, few buildings are shown on the north side of Tavistock Square, although the district around had been laid out, and plans prepared for the erection of houses. Among those then standing was a large residential building known as Tavistock House, the site of which is now covered by the new quarters of the Association. Tavistock House was erected in 1795 by James Burton, a well-known builder or pseudo-architect of that date. In the forty years of his activity he is said to have erected more than 2,000 buildings in various parts of London, including the whole Regent Street, and many large houses in Regent's Park. He became very rich but unfortunately lost most of his money in an attempt to develop St. Leonard's-on-the-Sea and maintain to it a daily service of stage coaches.

Regarding the first occupants of Tavistock House we know little until it came into the possession in 1812 of one James Perry, a well-known journalist and popular reformer of that period, who made use of it as his residence. James Perry owned the *Morning Chronicle*, a very outspoken reform paper, and the leading organ of the Whig party. Lamb, Hazlitt, Coleridge and Campbell all contributed to it. Perry's articles on several occasions gave offence and landed him in the police court. In one article he sarcastically suggested that the dresses of the opera dancers were regulated from the House of Lords, and for this he was sentenced to three months in Newgate. He appears to have taken his punishment very lightly, for during his term he held levees for his friends, and presents of game and other luxuries poured in upon him. In general, it may be said that his numerous fines and commitments only increased his fame, and brought him new friends. He died in 1821. After his death Tavistock House was converted into three residences by additions at each end. The new owner was one Thomas Hill, of whom we know little, but on his death, George Henry Robins acquired it. He was a celebrated auctioneer whose fame became a household word in London owing to his very flowery description of the properties he sold. His name appears in the Ingoldsby Legends in a comical verse directed against those who would ill-treat children. Robins, however, was a generous supporter of all charities. It is related of him that on one occasion at Margate he was stirred to

make a collection for the Royal Sea Bathing Infirmary, and held a plate in the street outside the church gate, and in his flowery language besought contributions for the charity. For this act of public begging he was taken by the police into custody and charged before the magistrate as being a rogue and a vagabond. He was acquitted, and afterwards brought action against the magistrate, and was awarded £50 damages.

In 1851 Charles Dickens became the occupant of Tavistock House. In a lease signed in 1852 the three residences into which the original Tavistock House had been converted, were described as follows: The building on the east later known as Russell House, was leased to Frank Stone, R.A.; the centre house to a John Cardale of whom little is known, and the western residence to which was given the original name of "Tavistock House" was leased to Charles Dickens, who had formerly been a youthful reporter on the *Morning Chronicle*, came to live in the residence, closely adjoining and bearing the same name as the house formerly occupied by James Perry, whose memory still lingered as the famous original proprietor of the *Chronicle*.

Dickens was of a restless and nomadic nature, and moved his residence frequently, but he remained longer in this house than in any other excepting Gadshill in which he died. The nine years of his residence here included the most brilliant period of his life. In Tavistock House he wrote or began the writing of *Bleak House*, *Hard Times*, *Little Dorrit*, *A Tale of Two Cities*, and *Great Expectations*. In addition to these he undertook in connection with Mark Lemon and a few assistants a series of children's theatricals, in a room which, although the smallest theatre in the world, was crowded at every performance with the leaders of literary and artistic London. The children of Dickens and of Mark Lemon appear to have displayed unusual dramatic powers and the rendering of the song "Miss Villikins" introduced into Fielding's burlesque of *Tom Thumb* is said to have so affected Thackeray that he rolled off his seat in a burst of laughter. *The Lighthouse* by Wilkie Collins was the first of the adult plays to be given. The drop curtain for this act was painted by Clarkson Stanfield, R.A. in two days and was

afterwards framed and sold at the Gadshill sale for a thousand guineas.

The great Danish writer Hans Christian Andersen was once the guest of Dickens, and has thus described the house:

"In Tavistock Square stands Tavistock House. This and the strip of garden in front of it are shut off from the thoroughfare by an iron railing. A large garden with a grass plot and high trees stretches behind the house and gives it a countrified look in the midst of this coal and gas steaming London. In the passage from street to garden hang pictures and engravings. Here stands a marble bust of Dickens, so like him, so youthful and handsome; and over the dining room door are inserted the bas-reliefs of Night and Day by Thorvaldsen. On the first floor is a rich library with a fireplace and a writing-table, looking out on the garden; and here it is that in winter Dickens and his friends acted plays to the satisfaction of all parties. The kitchen is underground, and at the top of the house are the bed-rooms. I had a snug room looking out on the garden; and over the tree-tops I saw the London towers and spires appear and disappear as the weather cleared or thickened."

After Dickens gave up the house in 1860 it was occupied from time to time by other celebrated persons. It shortly afterwards became the dwelling of a noted singer, Mrs. Georgina Weldon, whose ability in conducting some actions-at-law made considerable stir in the late seventies and eighties. The great French musician Gounod lived some months with the Weldon's in Tavistock House and gave singing lessons in the drawing-room and here he composed the well-known music of the *Maid of Athens*.

A minor poetess now almost forgotten, Eliza Cook, authoress of the *Old Arm Chair* and other sentimental poems was also an occupant of this house.

William Collins, R.A., whose pictures were very popular, and often engraved, lived for a short time in the adjoining square and there in 1824 his son, William Wilkie Collins, the novelist, was born. He became a close friend and collaborator of Dickens, and was a frequent and welcome visitor at Tavistock House.

Across the road from Tavistock House were some buildings in which, in 1831, Thomas Carlyle lodged when he was vainly trying to find a publisher for *Sartor Resartus*. From his back windows Carlyle looked upon Tavistock House where in after years he was a frequent guest. Tavistock House was pulled down in 1900.

A. D. B.

AUSTRALIA

The following is taken from a recent number of *The Medical Journal of Australia*:

Since the publication of the last Education Number of *The Medical Journal of Australia* no amendments have been made in any of the Australian States in connection with the Acts dealing with medical registration.

The conditions and qualifications necessary for registration are distinctly different in each of the several

states and graduates and diplomates in medicine are required to be registered in each state in which they desire to conduct practice. We have repeatedly drawn attention to the disabilities occasioned by the operation of six different Acts in the Commonwealth. Although progress in this matter is slow, there are indications that the states may in the near future be persuaded to surrender their sovereign rights in this regard to the federal authority.

News Items

NOVA SCOTIA

The vital statistics of Nova Scotia, which have heretofore been collected and compiled by another department of the provincial government, will henceforth be under the control of the department of the public health. Dr. A. C. Jost, provincial health officer, has been appointed Deputy Registrar General. This change in policy, and the appointment of Dr. Jost, will meet with the approval of the medical profession.

A movement has been initiated to secure funds for the enlargement of the Dawson Memorial Hospital, at Bridgewater. This hospital has been in operation for only a few years, but has proved so popular with the people of its constituency that its accommodation is being taxed to the utmost. It is proposed to construct a wing which will serve as a residence for the nurses and also provide room for the x-ray department and clinical laboratory, and thus release space for more ward accommodation.

Dr. John Cameron, professor of anatomy, at Dalhousie University, was married, on the ninth of July, to Miss Elsie Moffatt, J.P., daughter of Provost Moffatt, of Forfar, Scotland. The wedding took place at the home of the bride, and was featured by the

singing of a hymn composed expressly for the occasion. The esteem in which Dr. Cameron and his bride are held was evidenced by a very large number of beautiful and useful gifts. After spending some weeks in touring Scotland and England, Dr. and Mrs. Cameron will sail for Halifax, and will devote the remainder of the vacation to motoring in Nova Scotia.

At the recent elections, four of the twelve medical candidates were successful and will take their place in the provincial parliament when it reassembles. Two of these, Dr. B. A. LeBlanc, of Arichat, and Dr. W. N. Rehfuss, of Bridgewater, have been appointed members of the new (conservative) government. Dr. John A. MacDonald, of St. Peters, and Dr. J. L. MacIsaac, of Antigonish, are the other successful candidates. To these four gentlemen, the *Journal* extends hearty congratulations. The new government, under Premier Rhodes, takes office after forty-three years of administration by liberals. Naturally the change which has resulted from the elections has aroused much interest. Premier Rhodes and his colleagues have many difficult problems to face, and all good citizens will wish them every success in their efforts to restore industrial harmony and to improve business conditions.

PRINCE EDWARD ISLAND

The thirty-seventh annual meeting of the Prince Edward Island Medical Association was held in Charlottetown on July 8th. In the absence of the President, Dr. J. F. McNeill, of Summerside, occupied the chair. The visitors included Dr. I. M. Rabinowitch, assistant professor of medicine, McGill University, who delivered an instructive address on "Kidney Function," and Dr. G. C. Brink, of the Ontario Department of Health, who spoke on the "Value of Physical Signs in Pulmonary Tuberculosis."

Dr. R. E. Wodehouse, of Ottawa, was also present and spoke along the same lines as Dr. Brink. These two gentlemen were holding diagnostic x-ray clinics in different sections throughout the province, and much benefit resulted from their work.

Others who contributed papers were Drs. A. McNeill and I. W. Jardine, who dealt with delayed union in fractures; Dr. J. C. Houston, who presented a case of spirotricosis; Dr. E. T. Tanton, who discussed intussusception; Dr. G. F. Dewar, who read a paper on "Placenta

Previa"; and Dr. W. J. McMillan, whose subject was "Professional Etiquette."

A large amount of routine business was transacted and the meeting was one of the most successful the Association has held. Next year the Association will meet at Summerside with Dr. James Champion as president. The other officers for the ensuing year are Dr. G. F. Dewar, Secretary, and Dr. I. J. Yeo, Treasurer.

Dr. R. E. Wodehouse, Ottawa, and Dr. G. C. Brink, of Toronto, with their families spent their vacation at Brackley Beach.

Dr. Charles Kennedy, of New York, with his family are spending the summer in Charlottetown and at the beaches.

Dr. Reddy, of Montreal, is spending his holidays at his summer home at Keppoch. G. F. DEWAR

QUEBEC

Dr. Joseph Guerard has been named director of Laval Hospital, Quebec, in place of Dr. L. Leclerc.

An interesting address on tuberculosis was recently given by Dr. Couillard, director of the Lake Edward Hospital, before the Rotary Club, Quebec, and a warm tribute was paid to the work done by Dr. Leclerc.

The Ste. Agathe Sanatorium for sufferers from tuberculosis will be ready to receive patients September 1st. Definite assurance regarding the speedy completion of the work of renovation has been given by Lou S. Colwell, president of the Laurentian Sanatorium Association, which is operating the institution. The 210 beds will be ready for the sick who have waited month after month for the opportunity the Sanatorium will furnish of a chance for life and a return to health and strength. Every effort is being made to give all the business in connection with the sanatorium and its renovation to residents of the town in which it is situated. At a very early date announcement will be made of the formal opening of the institution and it is expected that the Mayor of Ste. Agathe, the alderman, clergy of all denominations and citizens will take the opportunity of inspecting the improvements.

The scale of rates for the tuberculous patients in the sanatorium, which has been taken over from the Provincial Government, has just been announced. The rate for private rooms will be \$35.00 per week, for semi-private

\$21.00 a week, and for wards of more than two beds \$14.00 per week, inclusive of board, medical and nursing care, medicines and a limited amount of laundry. There are no wards of more than eight beds in the whole sanatorium. The old or main building will be set aside for private patients exclusively. The Association has already received a number of applications for admission and is now in a position to consider them and to receive others at its headquarters, 47 Belmont Park, Montreal.

Canada could take pointers from a study of the methods of supporting hospitals in Norway, Denmark and Sweden, according to Miss S. E. Young, superintendent of the Training School for Nurses, Montreal General Hospital, who has just returned from the convention of the International Council of Nurses in Helsinki, Finland. In the three countries mentioned great interest is taken in the training offered to nurses, and municipalities are accustomed to give substantial grants to the maintenance of their hospitals, and take a great pride in having them fully equipped. In the chief hospital in Copenhagen the city pays sixteen times as much as the patient for the treatment received there, and no patient is charged more than twenty-five cents a day. The attitude of the people is that the public health depends largely on the hospital work and therefore the public should support the hospitals. In the opinion of Miss M. L. Moag, superintendent of the Victorian Order of Nurses, Montreal, Finland leads the world in child welfare work.

GEORGE HALL

ONTARIO

There were no graduates in medicine from the medical faculty of Queen's University for the year 1925 as a result of changing from the five to the six year course.

The registrar of the College of Physicians and Surgeons furnishes the following figures in connection with the spring examinations of 1925. There were 101 successful candidates: University of Toronto, eighty-two; Western University, thirteen; McGill University, five; Queen's University, one.

The registrar makes the further note that this is the year in which the change in the curricula from the five to the six year course took place, and there would have been no class for examinations had not the three universities, Toronto, Western and McGill begun their six year course before it was required by the college.

One hundred and seventeen students received the degree of M.B., from the University of Toronto, Faculty of Medicine, on June 4, 1925. The following scholarships, prizes and fellowships were awarded: the George Brown Memorial Scholarship, J. H. Couch, B.A.; the George Armstrong Peters Scholarship, C. E. Knowlton; the Reeve Prize, W. A. Costain, M.B.; the Chappell Prize, C. E. Knowlton; The J. J. Mackenzie Prize, C. H. Best, M.A.; the James H. Richardson Fellowship, Miss C. H. Craw; the Ellen Mickle Fellowship, C. H. Best, M.A.; the Charles Mickle Fellowship, A. Krogh, Ph.D., LL.D.

There were twenty-one graduates in medicine from the University of Western Ontario this year. All the

graduates passed at the examinations of the Ontario and Dominion Councils.

On June 26th, at a meeting of the York County Medical Society held at the home of Dr. Johns, Thornhill, Dr. E. E. King of Toronto gave an address on "The non-surgical treatment of enlarged prostate."

Dr. W. R. Campbell of Toronto addressed the Barrie District Medical Society at Barrie on June 30th, his subject being "Diabetes".

On July 3rd, Dr. John Oille addressed the Victoria County Medical Society at Lindsay, taking as his subject, "The diagnosis and treatment of myocardial failure."

At a meeting of the Middlesex County Medical Society held at Strathroy on July 29th, Dr. W. G. Cosbie gave an address on "Obstetrical injuries and their after-results, with special reference to prevention."

The Huron County Medical Society met at Blyth on July 29th, Dr. A. J. Grant of London gave an address on "Neoplasms of the female breast."

Dr. H. W. Hill resigned as President of the Harvey Club when he accepted the position of Professor of Public Health of the University of British Columbia. Dr. J. W. Crane was elected to the vacancy and Dr. E. Spence was made Vice-President.

MANITOBA

The annual meeting of the Manitoba Medical Association will be held in the Fort Garry Hotel, Winnipeg, on September 22nd, 23rd, and 24th. The

programme has not yet been definitely arranged but it is expected that the following doctors will deliver addresses, H. T. Hadley Williams of London, Ont.,

L. G. Rowntree, Mayo Clinic, Rochester, Rood Taylor, Minneapolis, and T. W. Walker, Saskatoon. In addition moving pictures describing normal gastric phenomena, gastro-intestinal pathology, and pulmonary tuberculosis will be shown. The above dates have been set to fit in with those of the Alberta meeting which it is understood will be September 16th, 17th, and 18th.

The Southern Manitoba district held a meeting at Morden on July 15th. The principal speaker was Dr. O. J. Day, of Winnipeg, and his subject was "Common errors in the diagnosis and treatment of diseases of children."

Mr. A. R. McNichol of Winnipeg has contributed

the very handsome sums of two hundred and fifty thousand dollars to the Winnipeg General Hospital, and one hundred thousand dollars to the Children's Hospital, to be used for endowment purposes in whatever manner the boards may see fit. These gifts come at an opportune time for two hospitals which have rendered most valuable public service but which are by no means liberally endowed.

Dr. (Major) May Whittaker, the new superintendent of Grace Hospital of the Salvation Army, has arrived in Winnipeg with Adjutant (nurse) E. Hansell who will take the position of assistant superintendent. Dr. Whittaker has an enviable record of four and a half years service in France during the war and recently passed her examination for the Fellowship of the Royal College of Surgeons of London, England.

ALBERTA

Dr. W. Brand of Edmonton, has returned to Innisfree where he formerly practised.

Dr. J. A. Urquhart, who has been practising in British Columbia, has now settled at Mountain Park.

Dr. R. G. Grimmett of Edmonton, who has been taking post-graduate work in England for some months, is expected home shortly.

Dr. J. G. Young, who formerly practised in Saskatchewan, has located in Edmonton, where he will devote himself to diseases of the eye, ear, nose and throat.

Dr. Richard Parsons of Red Deer was recently elected to the Council of the College of Physicians and Surgeons, to fill the vacancy left by the death of Dr. Harry Brett.

This is the first time in many years that a Dr. Brett has not been a member of the Council, Lieut-Governor Dr. R. G. Brett having been a representative on this body from 1889 until 1915, when he assumed his present official position and was succeeded by his son, Dr. Harry Brett.

Dr. J. H. Birch, who has been studying in New York and in Budapest, Hungary, during the past year has returned to Calgary and will specialize in diseases of the eye, ear, nose and throat.

The Chiropractic Board of Alberta will hold the first examinations for license to practice, this autumn. All applicants must have a preliminary education equal to that required for entrance into Medicine in Alberta. Since the Act was passed the authorities have insisted that a Chiropractor must be licensed in order to practise.

G. E. LEARMONT

BRITISH COLUMBIA

At a recent meeting of the British Columbia Medical Association, the following doctors were appointed Chairmen of Standing Committees for the coming year: Legislative, Dr. M. J. Keys, Victoria; Industrial Service; Dr. T. H. Lennie, Vancouver; Publicity and Educational, Dr. Neil M. McNeill, Vancouver; Ethics and Discipline, Dr. I. Glen Campbell, Vancouver; Credentials and Constitution, Dr. A. W. Bagnall, Vancouver.

Dr. Wm. T. Kergin, of Prince Rupert, has returned home from his European trip, having been away three months.

Dr. Graydon Hume, of London, England, was a visitor in Vancouver for a few days, in the early part of July. He was greatly impressed with our wonderful scenery, well equipped hospitals, and particularly with the work of the British Columbia Medical Association.

Dr. D. J. Barclay, who quickly recovered from his recent automobile accident, was able to resume his holiday, which, with Mrs. Barclay, was spent on the coast, where they renewed many old friendships.

The holiday season is in full swing, weather perfect, and many doctors are taking advantage of the

business office of the British Columbia Medical Association to obtain locum tenens, so that they may get away for a well earned rest.

Dr. J. W. Lang, late of Hutton, B.C., and Mrs. Lang, are to be congratulated on the birth of a daughter.

Dr. A. A. King, of Ladner, returned to his practice on August 1st, after doing six weeks strenuous post-graduate work in eastern cities.

Dr. D. G. Morse, of Port Haney, is taking a month's holiday from August 8th. His practice will be taken care of by Dr. H. C. MacKenzie.

Dr. E. W. Ewart has relinquished his practice at Terrace, and is now acting as assistant to Dr. Moffat, of Vancouver.

Interesting communications are received from time to time, by the British Columbia Medical Association, from Dr. Carl M. Eaton, of Atlin, B.C., who has now been isolated in this most northern town in the province, for nearly three years. His many friends in Vancouver will be glad to see Dr. Eaton, when he

passes through this city in the fall, on his way east to take post-graduate work.

Dr. Lewellys F. Barker passed through Vancouver towards the end of July, and the members of the Vancouver Medical Association turned out in force to hear an address by him on the "Nature, causes and prevention of nervous breakdown." In his address, Dr. Barker touched on some of the burning topics of the day, such as the community's responsibility to criminals and delinquents, the teaching and application of the principles of eugenics, and the need for departments of mental hygiene in the public schools and colleges.

Miss Johns, Professor of Nursing at the University of British Columbia, has resigned that position to take up work for the Rockefeller Institute in the organization of nursing in Czechoslovakia. Miss Johns will be very much missed in nursing circles in Vancouver.

The University of British Columbia, at the close of the holidays, will open its doors in the new (temporary) buildings at Point Grey. The only permanent building completed at present is the Science Building, which will house the library. The temporary buildings erected are of stucco and will probably be in use for some years. The old university buildings, in Fairview, will be taken over by the Vancouver General Hospital to meet the need for increased accommodation.

On July 27th, the Victoria Medical Society met in the Library Room to hear a most interesting and instructive address by Dr. David MacKenzie, of McGill University and the Royal Victoria Hospital, Montreal. In spite of the summer season and medical holidays there was a good attendance and those present signified their appreciation by prolonged applause in response

to a motion of thanks to Dr. MacKenzie. Dr. MacKenzie dealt with "Tumours of the bladder." Again the Victoria profession found itself enjoying instruction from a teacher from one of the educational centres even though it was necessary to encroach on Dr. MacKenzie's well earned vacation from which he so graciously spared an evening.

The Victoria members are pleased indeed to note that arrangements are being made for a programme of post-graduate courses under the Canadian Medical Association.

At the meeting of the Victoria Medical Society, held on July 27th, Dr. Raynor gave a short but interesting résumé of the proceedings of the Canadian Medical Association annual meeting at Regina. This was well received as the members of the Victoria profession feel that they must be fully informed of the exact nature of the details to which they must attend, to ensure the comfort and success of the meeting at Victoria next year. Dr. Forrest Leeder, President-elect of the Canadian Medical Association, was present, and a meeting will be held in the near future to commence active planning for the 1926 meeting. If Victoria can duplicate the weather of this and past years, we can safely promise those who attend a very busy time enjoying a full programme under temperate weather conditions.

Dr. Gordon C. Kenning is holidaying with his family at Chemainus, where the big salmon have been running.

Dr. J. W. Lennox and family are again at Parksville on Vancouver Island. Dr. Lennox, who is the popular Vice-president of the Victoria Medical Society, returned to Victoria with his complexion ruined by sunburn. He reports the bathing as good.

UNITED STATES

NOTICE OF EXAMINATION FOR ENTRANCE INTO THE REGULAR CORPS OF THE UNITED STATES PUBLIC HEALTH SERVICE

It has been recently announced by Surgeon General Cumming of the U. S. Public Health Service that on September 14, 1925, examinations of candidates for entrance into the Regular Corps of the U. S. Public Health Service, will be held at Washington, D.C., Chicago, Illinois, New Orleans, Louisiana and San Francisco, California.

Candidates must be not less than twenty-three nor more than thirty-two years of age, and they must have been graduated in medicine at some reputable medical college, and have had one year's hospital experience or two years' professional practice. They must pass satisfactorily, oral, written and clinical tests

before a board of medical officers and undergo a physical examination.

Successful candidates will be recommended for appointment by the president with the advice and consent of the senate.

Requests for information for permission to take this examination should be addressed to the Surgeon General, U. S. Public Health Service, Washington, D.C.

AMERICAN BOARD OF OTOLARYNGOLOGY

The next examination given by the American Board of Otolaryngology will be held at the Cook County Hospital, Chicago, on October 19, 1925. Application should be made to the Secretary, Dr. H. W. Loeb, 1402 South Grand Boulevard, St. Louis, Missouri.

Items.—Commerce and industry will be required to contribute to the financial support of scientific research in France, if a measure passed by the Chamber of Deputies is also approved by the senate. The bill provides for a tax of five centimes on each 100 francs paid in salaries by industrial and commercial concerns. The sum

which the tax would raise for French scientific laboratories is estimated at 14,000,000 francs a year. This is about \$700,000 according to the present rate of exchange.

"In sickness respect health principally; and in health, action."—Bacon.

Book Reviews

Anaphylaxis and Sensitization. R. Cranston Low, M.D., F.R.C.P. 384 pages, 16 coloured plates, 7 half-tone illustrations. The Macmillan Company of Canada, Toronto, 1924.

Dr. Low's book has a wider scope than that indicated by the title. It soon becomes apparent, in studies of this nature, how closely linked are anaphylaxis and sensitization with a multitude of other subjects, and one therefore finds in this book, discussions on such conditions as urticaria, drug eruptions, the erythema, and various skin infections. The book, in fact, is based on work carried out in the Skin Department of the Royal Infirmary of Edinburgh, and Dr. Low expresses the hope that it will be of assistance to the pathologist and bacteriologist, as well as the dermatologist. It is this catholic point of view which makes the book additionally attractive to the general practitioner.

It has not been attempted to describe actual skin eruptions, although there are some excellent plates of certain conditions: but the author deals rather with the method of production of these eruptions, and, as he points out, the study of the diseases of the skin is peculiarly dependent on a knowledge of sensitization. The literature on the subject is enormous in volume, but Dr. Low has compiled a bibliography which is a guide to all the important and most recent work.

One cannot withhold a note of commendation on the clearness of expression with which the book is written, the convenience of arrangement, and the general excellence of its production.

H. E. MACDERMOT

A Memoir of William and John Hunter. By George C. Peachey. Large 8vo, xi+313 pp. William Brendon and Son Ltd., Plymouth, 1924.

The author who has given us *The History of St. George's Hospital* found that his researches in records of that hospital and the illustrious members of its staff led him into much detail of the lives of William and John Hunter. He found he could not study the hospital without getting into intimate contact with the life of the great pathologist and naturalist with whose name it will always be associated. Through access to the family documents at Long Calderwood, the home of the Hunters, the author was able to examine, and transcribe at will much biographical material which has not previously been published. He has also been able to correct a number of mistakes as to dates, and other errors which crept into early biographies and which have been copied by late writers who have accepted them as authentic. By a careful study of original papers and records we have been given an intimate picture of the early life and professional attainments of these great men. His study of the early career of William Hunter revealed the lack of published knowledge of the teaching of anatomy before his time. By recounting the legal provisions for the supply of subjects for dissection some idea is gained of the difficulties which confronted the early teachers of anatomy. Early eighteenth century files of newspapers appear to have been searched for the announcements of anatomical demonstrations not published elsewhere. Some fifty pages are devoted to the early teaching of anatomy in London with biographical reference to the teachers when available. The detailed accounts to body snatching which are so well told in Bransby Cooper's *Life of Sir Astley Cooper* do not appear. This article deals rather with schools, men and regulations.

The Hunter family afford an interesting subject for the biographer. The mother "a woman of great worth and considerable talents"; the father "earnest, devout and endowed with plenty of worldly knowledge";

William, who never married, but acted as a parent and teacher to each of his brothers and to his nephew and heir, Matthew Baillie, to whom anatomy owes a debt in some measure comparable to that owed by pathology to John; John, who became the greatest pathologist of his own or perhaps all time and whose unrivalled collection was purchased by the nation; James, who was first educated as a lawyer and whose death in early manhood alone prevented his attaining in medicine a distinction as great as his brothers in anatomy and pathology; the nephew Matthew Baillie whose *Morbid Anatomy* was the first attempt to treat pathology as a special subject; the niece Joanna Baillie whose plays and poems have found a place in English literature. With so much tempting material about him the author has restricted himself to the two illustrious brothers and has given us a memoir which stands as the best which has appeared. Compiled as it is from original sources, all of which have been carefully reviewed there would appear to be little that is of importance for future biographers to discover and record.

J. H. ELLIOTT

The Medical Annual. \$5.00. John Wright & Sons Ltd., Bristol, England, 1925.

The Medical Annual of 1925 has as its contributors prominent leaders of the profession in its various branches. Men like Hey Groves, Ramsay Hunt, Leonard Rogers, Lockhart-Mummery, Rolleston, Adson and E. Wyllys Andrews, to mention a few of the writers in this issue; and these bespeak not only authority in their special tasks but also the international character of this valuable book.

If you pick out various subjects here and there that have your particular interest, you will find a most concise but readable résumé of the recent work on those subjects. And there is, in addition, a most useful bibliography to fall back on if one wishes to consult original articles. Subjects like The Sympathetic Nervous System, Lung Abscess, Encephalitis, Tetany, Asthma, Ventriculography, Radium application versus Hysterectomy, etc., which have been well in the forefront of medical attention during the last year or so, are ably and clearly presented. In blood transfusion not only the technique and anaphylaxis but the effect that repeated transfusions have on the donors is presented. In Osteitis Fibrosa the very valuable contribution of Dawson and Struthers is outlined and the relationship of this disease to pathology of the parathyroid gland with consequent abnormal calcium metabolism is shown.

The general practitioner will find the subject of blood pressure of particular interest. Here the recent work of Stocks is given. Stocks' observations were made on individuals between the ages of five and forty with the idea of finding the normal range of systolic, diastolic and pulse pressure.

Many special subjects are covered in this work. Eye, ear, nose, skin, etc., and also a list of new pharmaceutical products and new medical and surgical instruments and appliances are given.

The great usefulness of this work is shown by the fact that one medical librarian said that it was probably the most frequently used book in his library.

W. D. KEITH

The Cerebro-Spinal Fluid in Clinical Diagnosis. By J. Godwin Greenfield, M.D., and E. Arnold Carmichael, M.B. 8vo. xii+272 pp. Price 12/-. Macmillan and Company. London, 1925.

This is an attempt to collect in a small volume all that is definitely known about the nature of cere-

When Prescribing!

QUININE ERGOTIN & STRYCHNINE

**SOLUBLE
ELASTIC CAPSULE No. 39 (Frosst)**
IS AVAILABLE

Emmenagogue
Hemostatic
Uterine Stimulant

R
Quinine Sulphate 2 grs.
Ergotin 2 grs.
Strychnine 1-30 gr.

Used in Metrorrhagia, Dysmenorrhea and Subinvolution of the Uterus

DOSE: "One Capsule three times daily"

{ This Capsule reflects the high standard
typical of "Frosst's" Blaud Capsules }

Charles E. Frosst & Co.

MONTREAL, CANADA

Manufacturing Pharmacists since 1899

For your chronic cases that require a constitutional treatment and building up,—

ANGIER'S EMULSION

will give you excellent results.

Try it—either plain or in combination with any treatment being used.

Free trial bottles sent on request

Canadian Distributors

Wingate Chemical Company, Ltd.
Montreal, Canada

Angier Chemical Company
Boston 34, Mass.

bro-spinal fluid and of its variations in disease. As a summary of our knowledge it forms a desirable volume for the neurologist, the pathologist and the laboratory worker. It deals not only with the fluid obtained by spinal puncture but with that drawn off from the cisterna magna and the lateral ventricles of the brain. Many of the observations made are based upon the records of examinations at the National Hospital for the Paralyzed and Epileptic. The book is arranged in three parts. The first deals with the nature and composition of the spinal fluid in health and disease, the second with its characteristics in certain special diseases, while the third part treats of the technique of examination of the fluid. The anatomy of the spaces in which the fluid is found together with the physiology of its secretion, absorption and circulation are considered in the early part of the work.

J. H. ELLIOTT

Pathology. General and Special. J. Martin Beattie, M.A., M.D., M.R.C.S., L.R.C.P. and W. E. Carnegie Dickson, M.D., B.Sc., F.R.C.P. 1103 pages, 499 illustrations and 17 coloured plates. Third edition. Price 42/- net. Wm. Heinemann Ltd., 20 Bedford St., London, W.C.2, 1925.

This work is divided into the two great divisions—general and special—each requiring about one half of the volume.

The general pathology is taken up in a sensible, logical manner, and one is gradually led up to the fundamental phase of inflammation. Inflammation is considered very comprehensively and yet is not laborious to the reader. Tumours are concisely and intelligently reviewed. The portion on "Animal Parasites" is rather extensive. Immunity is carefully considered, while anaphylaxis is only casually mentioned.

The special pathology occupies the latter half of the volume and that portion on "Diseases of the blood and blood forming organs" is particularly interesting. The pathology of the nervous system is well written and fairly comprehensive.

The book is well printed on good paper, well bound and indexed conveniently; in all, a very interesting and valuable addition to one's library.

R. B. MALCOLM

Health and Environment. By Leonard Hill, M.B., F.R.S., Director Department of Applied Physiology, National Institute of Medical Research and Argyll Campbell, M.D., D.Sc., Member of Research Staff, National Institute for Medical Research. Cloth, 201 Pages, 7 plates, 20 charts and diagrams. Price 12/6 net. Edward Arnold & Co., London, 1925.

The authors of this volume have secured their material from reports of the Medical Research Council embodied in series Nos. 32, 52 and 73; these deal with "The science of ventilation and open air treatment" and "The kata-thermometer in studies of body heat and efficiency." The purpose is to present to the educated public the substance of these valuable reports in a more concise and simple form and to bring before the people some of the conditions that are apparently opposing improvement of the nation's health.

Many of the environmental conditions that influence health are dealt with and presented in commendable form. Much stress is laid on impurities of the atmosphere and ventilation and heating. One chapter deals fully with the kata-thermometer and explains clearly the function of this instrument in ventilation by measuring the cooling and evaporative powers of the atmosphere which depend upon air movements.

The volume cannot be considered a textbook but it will convey to the interested public an outline of the problems of sanitation which confront us and which have such an important bearing on national health.

F. W. LUNEV

Chronic Disease. A Working Hypothesis. Edward Bach, M.B., B.S., D.P.H. and C. E. Wheeler, M.D., B.S., B.Sc. VIII+153 pages. Price 7/6 net. H. K. Lewis & Co. Ltd., London, 1925.

This book is an attempt to establish on bacteriological and clinical bases the following thesis: "The ordinary diet of civilized life predisposes to chronic bacterial infections of the intestinal tract. These infections vary in their virulence, but the essential factor which makes them dangerous is their chronicity. Single doses of their toxins by tests on animals may appear but slightly virulent, if at all, but the cumulative effect of them, absorbed day in and day out, year after year, is a potent cause of many varieties of chronic disease." The authors believe that our ordinary diet is entirely wrong and that the proper dietary should be of "food as largely as possible uncooked" and proceed to show how a diet so constituted alters the appearance of the faeces and their bacteriological constituents. However, it is frankly admitted that such a dietary seldom, if ever, succeeds in freeing the intestinal tract of the bacteria that they believe are causative of "many varieties of chronic disease." To control these, vaccines are required in addition and an explanation is given of the methods of examination and culture needed to secure the mother cultures for these and prepare vaccines. A chapter is then devoted to the clinical results and a summary given of the application of their methods in 500 cases (under twenty-nine disease headings.)

The book is a rather interesting one, especially to those who have to deal with chronic gastro-intestinal diseases, but the evidence presented to maintain the thesis seems to the reviewer to be slim indeed, in fact not sufficient even to justify the verdict of "not proven".

W. T. CONNELL

Statistical Methods For Research Workers. By R. A. Fisher, M.A. 239 pages, with charts. Price 15/- net. Oliver and Boyd, Tweedale Court, Edinburgh, 1925.

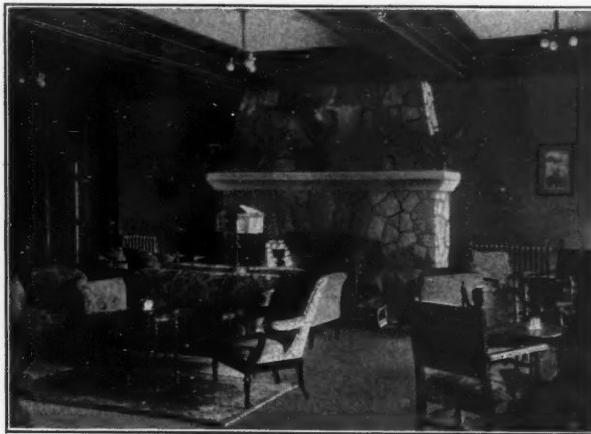
Research students in all departments of science recognize that many problems arise, the solution of which cannot be regarded as satisfactory without a statistical consideration of the numerical data. Tacit appreciation of this fact is shown by the repetition of experiments. To those with limited mathematical training, attempts at solution of problems by reference to standard works on statistics only strengthen the prevalent idea of their prohibitive nature. One of the reasons is that simple principles are usually clouded with rigid arguments from which they are deduced. The general impression left is that the subject of statistics is hermetically sealed under forbidding terms and equations.

Statistical methods will only be made use of by the majority of workers directly proportional to the simplicity with which this science is presented. The author of "Statistical Methods for Research Workers" appreciates this. He has selected the salient principles and has systematically constructed in small space a work which makes it easy for the reader to get a clear conception of the methods of applying statistical tests to numerical data.

The chapter on time, correlation and frequency diagrams is brief and to the point. It gives the reader the kernel of the subject. The chapters on distributions and on means are clear and good. They show the simplicity with which it is possible to present this branch of the subject. Of particular value are the examples chosen to clarify the different processes. By presenting the subject in such a manner one can more readily ascertain the application of any process to any particular problem.

The book is meant to be read methodically as a connected treatise. Should one, however, wish to use it as a laboratory reference, it is necessary, as the

*Splendid
Golfing
facilities
also Bowling,
Riding,
Tennis
and all
outdoor
games*



*Especially
suitable for
Convalescence
from Illness,
Rheumatic
Conditions
and
Chronic
Fatigue.*

THE PRESTON SPRINGS HOTEL, - PRESTON, ONT.

Attention is directed to the excellent facilities offered by the Preston Springs for the entertainment of guests, requiring Electro and Hydro Therapeutics under experienced medical supervision.

Write to Preston Springs Hotel, Preston, Ontario, for rates and booklet

Franco-American Antidolorin

(Ethyl Chloride of Guaranteed Purity)

Free from Acids, Aldehydes, Sulphur Cpds., Ethel, Alcohol, moisture and free chlorine.
Containers—60 and 100 gm. glass tubes, with automatic closure caps.

ETHER—"Pro Narcosi"

A Sulphuric Ether, manufactured with the greatest of care under expert supervision, being stronger and purer than the U.S.P. 9th Edition requires. Entirely free from impurities, thus assuring the anæsthetist that there will be no ill after effects, such as nausea and conditions which give rise to pneumonia.

CHLOROFORM, U.S.P.

A doubly rectified product free from free chlorine, chlorinated decomposition products, and other impurities.

Owing to the increased sale of Franco-American products, we have been appointed special selling agents for Canada. If your dealer cannot supply you, write or phone us and we will gladly give you literature, samples and prices. *Specify Franco-American because they are the purest.*

Ethical Drug Products Limited - 547 Parliament St., Toronto

Manufacturers of fine Pharmaceuticals - Special Selling Agents for Canada

author warned, to take the pains to work through the appropriate example, in all numerical detail, in order to thoroughly appreciate the meaning to be attached to the process, and to recognize whether the data to be tested are appropriate for parallel treatment.

The publication of this work should prove successful.
I. M. RABINOWITCH

Simplified Nursing. Florence Dakin, R. N. 497 pages, 77 illustrations. Price \$3.00. J. B. Lippincott Co., 201 Unity Bldg., Montreal, 1925.

This book gives simple but definite instruction in general nursing. It is conveniently arranged in thirty-eight lessons with adequate index and glossary. While it is a valuable text-book for the nurse in training, it should be of especial assistance to the trained attendant or the home nurse of the family. It gives in detail the little practical points of general nursing and first aid, and also, clear, common sense instructions regarding disinfection, sterilization, the preparation of food, and the carrying out of treatment. There is sufficient physiology and bacteriology given to instil interest in the technical instruction, and enough of the ordinary symptoms of disease outlined to make the student or attendant conversant with the general condition of the patient.

A. H. MACCORDICK

Physical Diagnosis of Diseases of the Chest. Joseph H. Pratt, A.M., M.D. and George E. Bushnell Ph.D., M.D. 522 pages, 166 illustrations Cloth \$5.00 net. W. B. Saunders Co., Philadelphia and London, 1925.

This work is the result of the experience of the writers in the classes of instruction in physical diagnosis as carried out in the Medical Reserve Officers' Camps, U.S.A., during the war. It was found that many physicians who had paid no especial attention to physical diagnosis, became interested in the subject and developed a previously unsuspected facility. Colonel Bushnell was in charge of the Division of Internal Medicine under the Surgeon General. He devoted all his time to tuberculosis, and to standardize the examinations for tuberculosis, he issued *Circular No. 20* which became a classic and has stood well the test of time. Within a year of entering the war he had 450 especially trained tuber-

closis examiners at work to weed out all cases of active tuberculosis from the army. Bushnell is responsible for the section of the book dealing with respiratory diseases. Dealing only with diagnosis, he restricts his writing almost entirely to a discussion of physical signs. There is only passing reference to radiology under pneumothorax and tuberculosis. Even the value of history and symptoms in such conditions as pulmonary abscess receive little notice. Hence the work is not a complete presentation of the subject of diagnosis. His chapters on diagnostic procedures as applied to diseases of the lung, and on physics and physiology in relation to physical diagnosis are splendid. The practitioner who reads these chapters can not but receive much help. Bushnell did not live to see his book in print. His death occurred while the book was in press.

Pratt's section of the book on diseases of the heart is based in part on anatomy, but chiefly on normal and pathological physiology. The fundamentals of the newer physiology of the heart and circulation have been included. The subject of diagnosis is dealt with from the point of view of bedside and office examination. Emphasis is placed on the simpler methods of diagnosis. The reader is reminded that the observant eye, the trained finger and the educated ear are of more value than all the instrumental means of diagnosis. Throughout the work there is an attempt to teach how to estimate the impairment of heart function rather than to deal with anatomical diagnosis alone. Pratt is to be congratulated upon his presentation of the subject.

J. H. ELLIOTT

Diabetes and Its Treatment by Insulin and Diet. Orlando H. Petty, M.D., and William H. Stoner, M.D. 133 pages, illustrated. Price \$1.50 net. F. A. Davis Co., Philadelphia, 1925.

This volume presents a clear, concise and up-to-date synopsis of the present treatment of diabetes, both as to diet and the use of insulin; intelligible to the patient and valuable as a ready reference to the physician. There are extensive tables giving the caloric value, the vitamin content, the protein fat and carbohydrate composition of foods. Other tables give salt free and acid and base forming diets. A chapter on cooking recipes should be of especial value to those who prepare the diabetics' food, outside the hospital. A. H. MACCORDICK

Arsenic Poisoning.—Twenty-eight cases of arsenic poisoning are reported by G. B. Lawson, W. P. Jackson and G. S. Cattanach, Roanoke, Va. Large quantities of arsenic were demonstrated to be present in cider which had been served at the noon meal. It was later learned that the barrel had contained an arsenic compound used for spraying trees. Thirteen of these patients died, the first death occurring in six hours, and the thirteenth on the thirteenth day after the taking of the poison. Ten of these deaths occurred in the acute stage, and the other three during the subacute stage, into which the patients had passed with a cessation of the acute symptoms on the second day. Immediately following the onset, vigorous supportive and symptomatic treatment was given; and nine patients,

all of whom survived, repeatedly lavaged their own stomachs with warm water. After the Marsh test had demonstrated an abundance of arsenic, it was decided to use sodium thiosulphate with the hope of inactivating the remaining arsenic by the production of its nontoxic, insoluble sulphid. No immediate improvement was observed following the use of sodium thiosulphate. To be of possible value in acute poisoning, it should be given at once and in maximum doses. Analysis of samples taken at the time of the poisoning showed the presence of 3.38 grains of arsenic (As_2O_3) per fluid ounce. Most of the patients drank several glasses of the cider, but because of the vomiting and diarrhoea it was impossible to determine the amount retained.—*Jour. A. M. A.*, July 4, 1925.

Fifty Years

- ¶ For 50 years LACTOPEPTINE POWDER has been used by the medical profession throughout the world.
- ¶ For generations LACTOPEPTINE ELIXIR has been recognized as the vehicle *par excellence* for unpalatable and harsh drugs.
- ¶ And, in thus making tolerable the intolerable, it has rendered a real service to the physician.
- ¶ But the ELIXIR, like the POWDER, has always been primarily a preparation characterized by marked digestive qualities by virtue of which it has maintained its integrity as a dependable digestive aid.

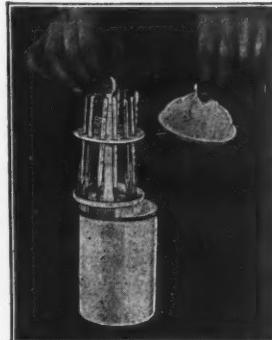
POWDER—ELIXIR—TABLETS

Lactopeptine

The New York Pharmacal Association
88 Wellington St. W. TORONTO, CANADA

MARTIN H. SMITH COMPANY, New York, N.Y., U.S.A.

SANITARY THERMOMETER JAR
For Your Instrument Table



For your instrument table, this white enameled thermometer sterilizer with removable rack, keeps your thermometers in a sterile solution at all times and prevents the possibility of damage from rough treatment. One dozen thermometers always ready for immediate use, always handy, always safe.

Holds Twelve Thermometers

The Sterilizer is made with a cup shape container, 6 in. high, 3 in. in diameter with white enameled cover. Inside of this is a white enameled rack for holding 12 thermometers.

SCA9307. White Enameled Thermometer Sterilizer with 1 dozen certified clinical thermometers, \$8.52

8 mouth, 4 rectal. Special offer now only

SCA1802. Thermometer Sterilizer. Only \$1.60

FRANK S. BETZ COMPANY

Hammond, Indiana

6-8 W. 48th St.
NEW YORK

634 S. Wabash
CHICAGO

The Pain of Gastric Ulcer.—Relief from the epigastric distress associated with chronic peptic ulcer is usually secured by eating, by emptying the stomach, or by the administration of alkalis. The rationalization of treatment as diverse as this must depend on a knowledge of the immediate occasion of the pain and the mechanism concerned in its genesis. The suggestion most commonly quoted at present makes active peristalsis responsible for the sensation of marked discomfort. Thus, it has been concluded that the peristaltic contractions are felt as pain when the ulcer is in an "irritable state," whereas similar peristalsis may proceed without conscious sensations at other times when the tissues are less irritable. The cogency of such an explanation must depend in large measure on the evidence that peristalsis and pain demonstrably occur and cease simultaneously. Ortmayer, who has investigated this aspect of the subject experimentally in human patients, remarks that any theory of motor phenomena as the cause of pain in ulcer, except that of continuous localized spasm, is at variance with the clinical observation that the distress of ulcer, when present, is usually continuous. The patient himself often describes his pain as gnawing or boring, not as a "spasm." Ortmayer's own observations of gastric movements recorded by the balloon method give no evidence that sodium bicar-

bонate and calcium carbonate, for example, relieve the pain of ulcer through lowering tension or tone or through decreasing peristalsis of the stomach, so far as either of these factors can be recorded by the procedure used. She says that it has always been difficult to explain the quick, unfailing relief to the pain of peptic ulcer obtained by giving a sufficient quantity of neutralizer, by emptying the stomach, or by eating on the basis of motor activity alone; for rapid simultaneous changes in the gastric motor activities are not observed. Hence one must still remain skeptical toward the conclusion that peristalsis causes the characteristic pain of gastric ulcer, even though it may be somewhat disconcerting to an inquisitive generation to continue to employ modes of treatment that are empirically effective though scientifically inexplicable.—*Jour. A. M. A.*, May 16, 1925.

Calcified Brain Tumor.—In the case reported by George M. Crabb, Mason City, Iowa, the tumor was spherical and wholly within the brain substance, and the calcium shell completely surrounded the cyst cavity. It was situated in the left frontal lobe, and was many times the size of any of the calcified tumors that have been reported heretofore.—*Jour. A. M. A.*, July 25, 1925.

THE PRINCIPLE OF THE GLANDULA PITUITARIA

HYPOPHYSIN

"HOECHST"

TRADE MARK

The Active Constituents of the Posterior Division in chemically pure form.

Accurately Standardized

Samples on Request

MALLINCKRODT CHEMICAL WORKS LTD.

468 ST. PAUL STREET WEST - MONTREAL